All you want to know about the BBC MICRO!

THE MICRO USER

Volume 1
Number 7
September 1983
£1

Robin to the rescue

Help him to save Maid Marian on Page 60

... then cut out the £1 voucher for the BBC Micro User Show in Nottingham

Inside the Electron

We strip off the cosmetics and reveal the bare facts about the BBC Micro's baby brother

More graphics techniques revealed

Program editing made easy

Save Earth from Galactic Invaders

Three rival DFS compared

Win the unique

HOBBIT

in a contest that everyone can enter – Page 45

ANDROID ATTACK

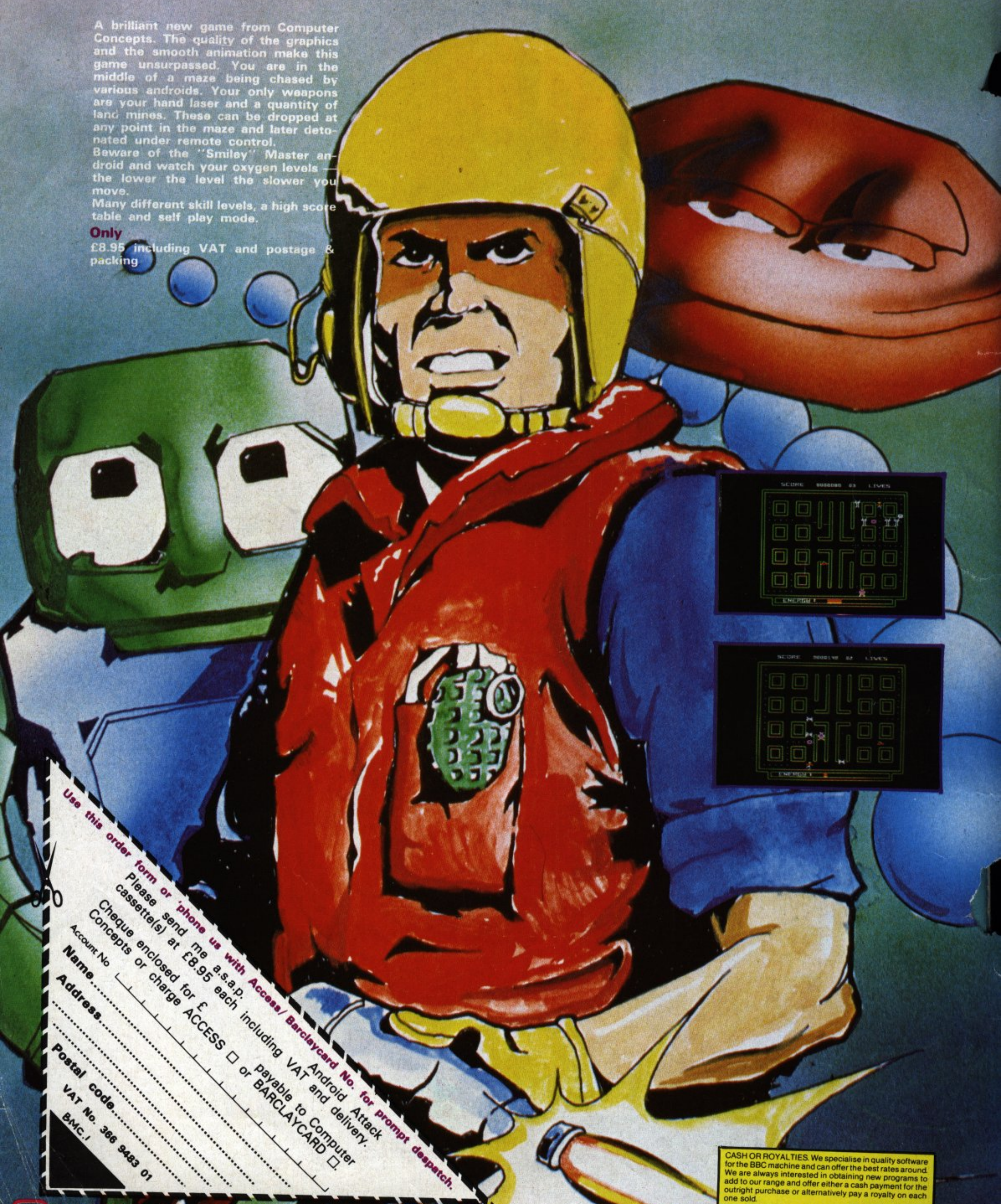
ANDROID ATTACK
ANDROID ATTACK

A brilliant new game from Computer Concepts. The quality of the graphics and the smooth animation make this game unsurpassed. You are in the middle of a maze being chased by various androids. Your only weapons are your hand laser and a quantity of land mines. These can be dropped at any point in the maze and later detonated under remote control.

Beware of the "Smiley" Master android and watch your oxygen levels — the lower the level the slower you move.

Many different skill levels, a high score table and self play mode.

Only
£8.95 including VAT and postage & packing



Use this order form or 'phone us with Access/ Barclaycard No. for prompt despatch.

Please send me a.s.a.p. Android Attack cassette(s) at £8.95 each including VAT and delivery.

Cheque enclosed for £ payable to Computer Concepts or charge ACCESS ☐ or BARCLAYCARD ☐.

Account No

Name..........

Address..........

....

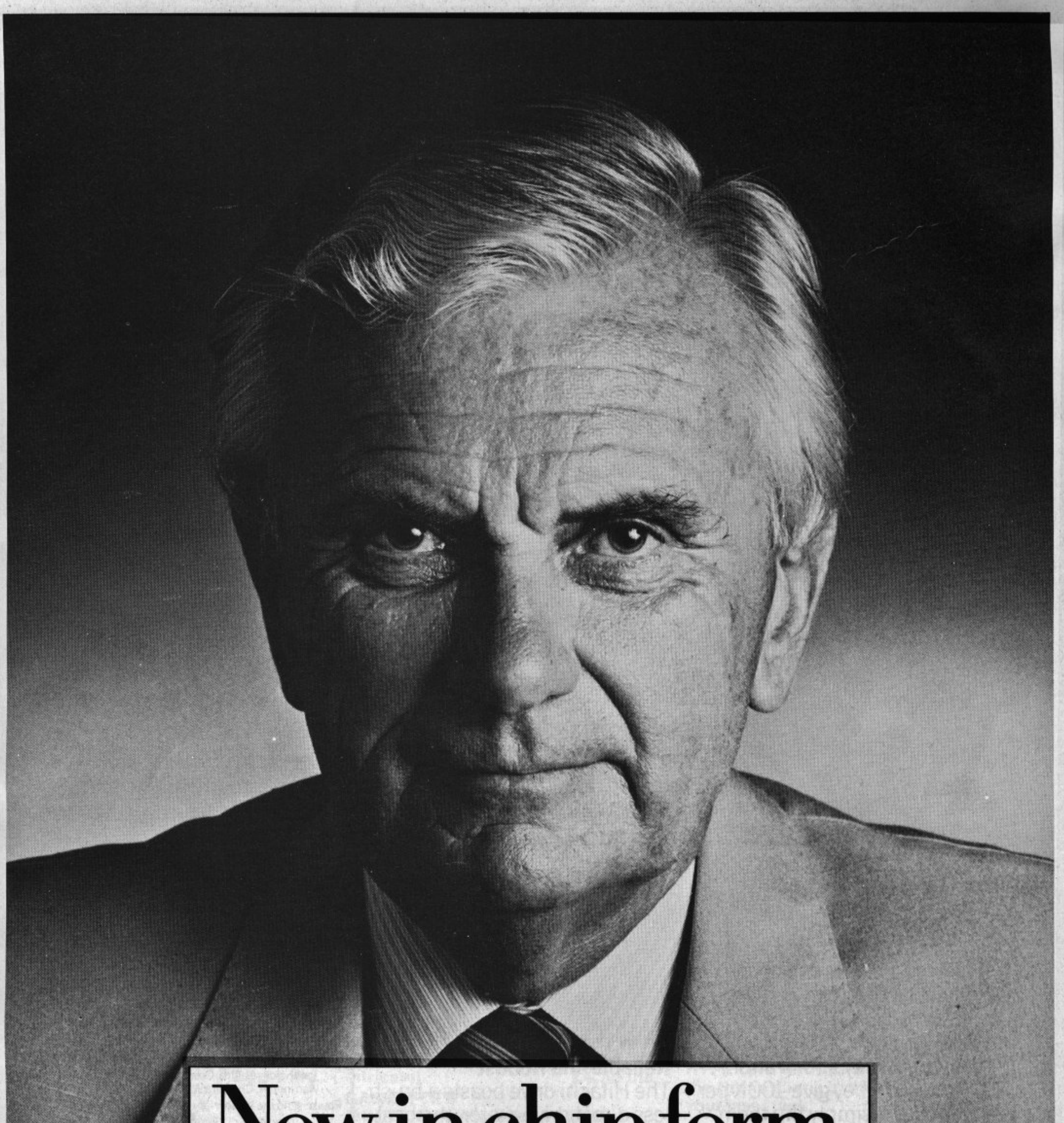
Postal code..........

VAT No. 366 9483 01

BMC.I

CASH OR ROYALTIES. We specialise in quality software for the BBC machine and can offer the best rates around. We are always interested in obtaining new programs to add to our range and offer either a cash payment for the outright purchase or alternatively pay a royalty on each one sold.

Computer Concepts 16 Wayside, Chipperfield, Herts.



Now in chip form.

If your BBC Micro could talk, what sort of accent would it have?

A BBC English one, of course.

Which is exactly why Acorn Computers, who designed and built the machine, have produced its very own speech chip featuring the dulcet tones of Kenneth Kendall.

Called Speech Synthesis, it's a pair of chips that can be plugged into your BBC Micro by your local BBC/Acorn dealer. On them, you'll find 164 words/syllables spoken in familiar fashion by the famous retired newscaster, all of which can be combined to form several hundred other words.

The chips also provide the 'serial' processing capability whereby future software cartridges can also be plugged into the front of your BBC Micro. (The machine's vocabulary will be widened via such cartridges.)

Priced £55, Speech Synthesis is available from your local BBC/Acorn dealer. (To find out where that is, simply call 01-200 0200.)

If you'd like more information, he'll complete the story. In plain English, of course.

ACORN COMPUTER

AMS announce the 3″ disk drive

DEALER ENQUIRIES

- ✻ Format and verify utilities on disk or EPROM
- ✻ Interface cables
- ✻ Manual
- ✻ Free disks

NB When used with some computers, both drives and disks have a double density capability. Educational and Institutional orders welcomed.

- ✻ Single 100k–£225
- ✻ Double 200k–£399

includes VAT and delivery to your door

The neatest and best disk option ever

We've taken the brilliantly engineered and proven Hitachi 3″* drive and housed it in rigid steel, textured and coloured to match your BBC Micro. And we've added cables, manuals, utilities on disk and EPROM, and free disks.

Japan, home of the major disk drive manufacturers, has decided to make the new 3″ disks a standard. And no wonder. Not only are they strong and easily stored, they give 100K per side, and you simply flip them over in the same way as a music cassette. The small light on the casing reminds you which side you are using.

The disk is totally encased in rigid plastic, with no exposed surfaces, is easily inserted with one hand and simply removed by pressing the eject button.

A unique feature of the new disks is a mechanical tab which prevents overwriting of precious data. And of course, you can switch it back when necessary.

Reliable and Robust

The Hitachi drive boasts a brushless direct drive motor, the best possible system for trouble-free use. AMS-3 units simply run off the BBC power supply—they don't need their own supply and there's no need to worry about corrupt data.

The standard interface lets you use the disk drive with most other computers and in tandem with 5¼″ drives.

High Speed Access

The disk drive provides a track-to-track access time of only 3mS, much faster than old-fashioned drives.

Reliable delivery

Fill in the coupon below and we will send it to you with our full no-quibble money-back guarantee.
Advanced Memory Systems Ltd, Woodside Technology Centre, Green Lane, Appleton, Warrington, Cheshire WA4 5NG.

*Disk drives supplied by Hitachi Europe Ltd.

RING (0925) 62907. 24-HOURS.

TO: Advanced Memory Systems, Ltd, Woodside
Technology Centre, Green Lane, Appleton,
Warrington, Cheshire WA4 5NG.

Please send me by door-to-door courier:

______(qty) AMS-3 (S) single disk drive at £225 each with free disk.

______(qty) AMS-3 (T) twin disk drives at £399 each with two free disks.

(Prices include EPROM, utility disk, cables, manual, VAT and delivery).

Please send me by post, if not with drives:

______(qty) double sided (100K x 2) disks at £4.95 each.

______(qty) packs of five at £22.50 per pack.

______(qty) utility EPROM at £15.

I enclose a cheque for £______

or debit my credit card

No______

Name______

Address______

Post Code______ Tel No______

Signature______

Please allow up to 28 days for delivery.

MORE OUT OF THIS WORLD SOFTWARE FOR THE BBC MICRO FROM IJK SOFTWARE...

GAMES FOR YOUR MODEL B OR A+32K MICRO

CASSETTE SEVENTEEN: 5-A-SIDE SOCCA

At last!!! The 2 player m/c game you have all been asking for. Uses joysticks or keyboard. Really exciting – pass, dribble, tackle and shoot.
£7.50 inc.

CASSETTE SIXTEEN: PONTOON & PATIENCE

PATIENCE
TURN CARD
SUIT

Excellent rendition of the two very popular card games....Psst! – red six on black seven!
£7.50 inc.

CASSETTE FIFTEEN: LEAP FROG

Superbly written m/c arcade type game. Beautifully presented, features lanes travelling at different speeds, skill levels, tunes, butterflies, parrots. For use with joysticks or keyboard.
£7.50 inc.

CASSETTE FOURTEEN: STRATOBOMBER

Excellent graphics on this m/c arcade type game. Can you keep the enemy fleet at bay in order to destroy the rogue star ships nuclear reactor?
£7.50 inc.

CASSETTE ELEVEN: ATLANTIS

The superb fast action m/c arcade type game. Guide your submarine Nautilus along the undersea landscape and through the caverns avoiding mines, depth charges, rockets, jelly fish, serpants etc. Features skill levels and user selected keys.
£7.50 inc.

OTHER TITLES AVAILABLE...

MODEL A/B
CASSETTE 1: Star Trek/Candy Floss (very popular). **£6.50 inc.**
CASSETTE 2: Family Games (hours of fun). **£4.50 inc.**
CASSETTE 3: Mutant Invaders/ Breakout. **£6.50 inc.**
CASSETTE 8: Model A Invaders (M/C). **£5.50 inc.**

MODEL B (or A+32K)
CASSETTE 4: Beep-Beeb (Super Simon Game). **£4.50 inc.**
CASSETTE 5: Beebmunch (full colour Munchman). **£6.50 inc.**
CASSETTE 6: Super Hangman (animated, educational). **£4.50 inc.**
CASSETTE 7: 3D Maze (fast and intricate). **£4.50 inc.**
CASSETTE 9
MODEL B Invaders (or A+32K) (M/C). **£7.50 inc.**

CASSETTE 10
WORDPRO. (Cassette W.P. system). **£10.50 inc.**

CASSETTE 12
FLAGS. (Countries and Capitals). **£4.50 inc.**

CASSETTE 13
HYPERDRIVE (M/C arcade). Destroy the Drone aliens in the caverns with your laser tank. **£6.50 inc.**

ALL PRICES FULL INCLUSIVE OF VAT AND P&P – NO MORE TO PAY

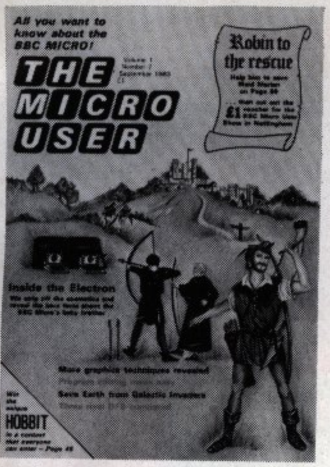
All advertised software is in stock NOW and will be despatched within 48 hours of receipt of order.

All Programs will run on ALL current OS versions and basic roms.

IJK Software Limited

24 HOUR ANSAFONE

9 King Street, Blackpool, Lancs.
Telephone (0253) 21555


All you want to know about the BBC MICRO!
THE MICRO USER
Robin to the rescue
£1
Inside the Electron
More graphics techniques revealed
Save Earth from Galactic Invaders
HOBBIT

Vol. 1 No. 7 September

Managing Editor
Derek Meakin

Features Editor
Mike Bibby

Technical Editor
Mike Cook

Art Editor
Peter Glover

Advertisement Manager
John Riding

Advertising Sales
Mike Hayes

Marketing Manager
Linda Dobson

Tel: 061-456 8383 (Editorial)
061-456 8500 (Advertising)
Telex: 667664 SHARET G

Published by:
Database Publications Ltd,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

Subscription rates for
12 issues, post free:
£12 – UK
£13 – Eire (IR £16)
£18 – Rest of world (surface)
£30 – Rest of world (airmail)

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

© 1983 Database Publications Ltd. No material may be reproduced in whole or in part without written permission. While every care is taken, the publishers cannot be held legally responsible for any errors in articles or listings.

The Micro User is an independent publication and neither the BBC nor Acorn Computers Ltd are responsible for any of the articles in this issue or for any of the opinions expressed.

Distribution to the news trade in the UK and Ireland is by Wells Gardner, Darton and Co Ltd., Faygate, Horsham, West Sussex RH12 4SU (tel: Faygate 444). Enquiries regarding overseas distributior should be made direct to the publishers.

CONTENTS

NEWS 9
Keep in touch with the latest happenings in the bustling world of the BBC Micro.

ELECTRON 19
Our technical editor looks inside the BBC Micro's baby brother and finds some surprises.

DISC SYSTEMS 22
Acorn's DFS is joined by two newcomers from Pace and Watford. We report the differences.

ANIMATION 31
Second part of our series teaching you how to put more colourful action into your programs.

EDITING 36
We show how use of the TAB ( ) statement can produce clear screen displays with ease.

LINK-UP 40
Turn your BBC Micro into a colour graphics terminal to link into a mainframe computer.

COMPETITION 45
Step back in time, write a review of Space Invaders – and win yourself a Hobbit.

BOOKSHELF 49
Our team of critics review four books that will help teach you more about the BBC Micro.

DIRECTORY 51
More additions to our pull-out guide to many hundreds of BBC Micro software programs.

GALACTIC INVADERS 53
A game to get your nerves a-tingle . . . a clever cross between two top arcade games.

TAPE OFFER 55
Save yourself the chore of keying in programs from this issue with this month's cassette.

57 **EPROM BLOWER**
We dissect the new ATPL eprom programmer and ask: "Is it really worth the money?"

59 **SHOWTIME**
Your invitation to the BBC Micro User Show in Nottingham – plus a £1 voucher.

60 **Game of the Month**

Robin and Marian

Put on your suit of Lincoln green and take a trip to Nottingham to rescue Maid Marian from the villainous Sheriff. . .

THE
BBC
MICRO
USER
SHOW

. . . and if you go there between September 16 and 18 don't miss our big show!

65 **SPREADSHEET**
Beebcalc, the spreadsheet program that turns the BBC Micro into a business computer.

66 **BACK ISSUES**
Find out about the articles you missed in the last six issues of The Micro User.

71 **SOFTWARE**
Our reviewers give frank appraisals of the latest games and educational programs.

74 **STRUCTURE**
Our series on structured programming deals with the value and importance of flowcharts.

77 **SUBSCRIBE NOW**
A year's subscription to The Micro User will bring you a FREE copy-holder and crib sheet.

79 **WORKSHOP**
If you've ever wondered how your BBC Micro stores its variables this article tells all.

85 **UPGRADE**
Our popular Beeb Body-building Course on how to control devices with your micro.

98 **BOOKSHOP**
We've chosen 10 of the best books for the BBC Micro for this month's offer to readers.

109 **MICROMAIL**
The pages you write yourself – just a small selection from the letters that are flooding in.

SOFTWARE WITH BITE FOR *BBC*

Alligata presents an existing range of games and utilities applying full machine code and high resolution, full colour graphics to the limit.

Whether it's hours of absorbing fun or the hours saved through data manipulation – Alligata has been designed for you.

ABM
Alligata

ABM (Model A or B) £4.95

Defend your universe against the alien force and guard the cities that provide your laser power.

Fruit Machine
Alligata

Fruit Machine £4.95

Keeping your money in your pocket enjoy all the excitement of beating the one arm bandit.

LUNAR RESCUE
Alligata

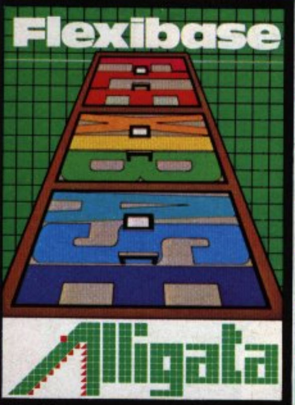
Lunar Rescue £7.95

Land your moon buggy and rescue a precious cargo, destroying all opposition on the way; finding your way back to the mother ship start again against greater odds.

COSMIC ASTEROIDS
Alligata

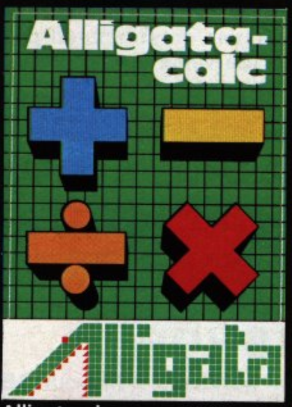
Cosmic Asteroids £4.95

Beware of surprise alien attack and menacing asteroid storms, in this exciting journey across space.



Flexibase £9.95 tape
£13.95 disk

The most flexible database yet seen – alphabetical, numeric or data sort with 16 search criteria – output to either screen or printer.



Alligatacalc £9.95 tape
£14.95 disk

The master spreadsheet – business or home – accounts, costings, profit and loss – solve any financial or numeric problems with automatic formulae calculation.

DMON

£7.95 tape **£11.95 disk**
£19.95 ROM

The best machine code monitor and disassembler available on the BBC. Features include: Full disassembler with ASCII dump, Full Hex dump with ASCII Conversions both with printer options. Reads any ROM currently plugged into machine and option to move blocks of memory to more convenient locations. Edit any byte of RAM. Run machine code sub routines from specified locations with option to set all registers and check their state at end of routine. 1.0 or 1.2 O.S. only. *Full machine code program in less than 2K*

Outstanding quality, unbelievable value

Order today by post or telephone!

Superior Systems Ltd., 178 West Street, Sheffield S1 4ET. Tel: (0742) 755005 VAT No. 308 5878
☐ Cosmic Asteroids ☐ Lunar Rescue ☐ Fruit Machine ☐ ABM
T D Alligatacalc T D Flexibase T D R Dmon (specify tape or disk)
Please debit my Access/Barclaycard (delete as necessary) allow 75p P & P
Card No: ______ Signature: ______
for £ ______ I enclose cheque/PO for £ ______
Name ______
Address ______

Despatch is normally made on receipt of order and should reach you within 7 days.

BBC Micro Model B unless otherwise stated.

Alligata

SOFTWARE WITH BITE

THE MICRO USER

NEWS

September 1983

MARGINAL CONCERN

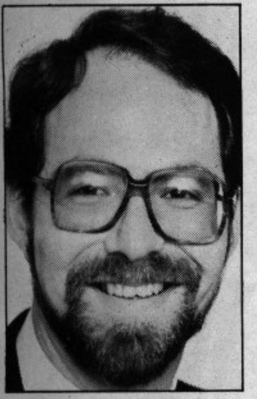
THE low dealer margins offered by Acorn on sales of the BBC Micro have raised the hackles of the Computer Retailers Association – the watchdog body for the micro trade.

Acorn's margins are notoriously small, and the CRA says it is very concerned and wants to do something about it.

It has sent a circular to dealers asking whether they can conduct a proper business under the present discount schedule.

"If they are not happy with the arrangement", said a spokesman, "then the CRA will take the matter further".

Beeb's baby brother is on the way!



Tom Hohenberg

ACORN hopes to sell more than 50,000 Electron micros before Christmas, according to Tom Hohenberg, the company's marketing manager.

Hohenberg anticipates some initial supply problems "because of the incredible demand". But he is confident that Acorn will be able to avoid the production snags that bedevilled the early and recent history of the BBC Micro.

"We will come up to a very high level of production very quickly", he said. "But despite our preparations we still won't be able to meet initial demand.

Planned

"We've pretty well sold all our planned production for the rest of the year – and that situation was reached even before the product launch.

"However we will build up our production to 20-25,000 Electrons a month before Christmas", he added.

The Electron, baby brother to the BBC Micro, is expected to be available this month.

It will cost £199 and will be sold through Acorn dealers and W.H. Smith branches – the only High Street multiple store to be allowed to handle the machine, at least until Christmas.

The Electron: "incredible demand"

Acorn describes the Electron as being "upwards compatible with the BBC Micro".

That means that the BBC Micro will be able to run all Electron software, but not vice versa.

The Electron has no Mode 7 feature and so won't run BBC Micro software that uses it.

Hohenberg says the Electron is also much slower than the BBC Micro.

- **Inside the Electron – see Page 19**

Hot seat for Hohenberg

THE launch of the Electron and the impending assault on the American market for the BBC Micro has put Tom Hohenberg of Acorn into the hot seat.

He was recently appointed marketing manager, and in his new role will be directing the company's advertising, public relations and sales promotions activities.

Research

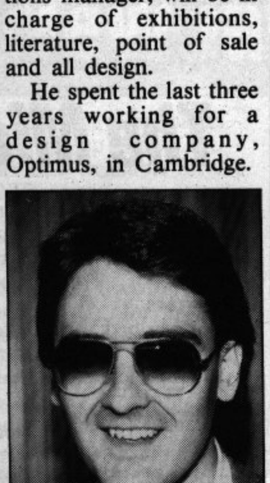
He is also responsible for product planning and market research.

He told *Micro User*: "There is so much happening at Acorn that my only real problem is deciding what to do first!"

Hohenberg joins the company from A.M. Amdel, the engineering graphics division of A.M. International, where he was director of marketing.

Another new face at Acorn is John Caswell who, as art and promotions manager, will be in charge of exhibitions, literature, point of sale and all design.

He spent the last three years working for a design company, Optimus, in Cambridge.



John Caswell

Free offer on disc pack

FOUR CP/M software packages which cost £1,150 are being offered free to buyers of the Torch disc pack.

This is the twin 400k drive unit which incorporates a Z80 card, the CP/M operating system, 64k RAM and its own power supply, and is compatible with the BBC Micro.

The new disc pack bundle, which costs £825, includes four integrated packages – PerfectCalc (a spreadsheet), PerfectWord (word processing), PerfectSpeller and PerfectFiler (a database program).

BBC Micro owners who have already bought the Torch disc pack have not been left out in the cold.

"We are offering them a special retro-pack which includes extra ROMs, software and the four Perfect packages for £300", said a spokesman for Torch.

He said the special package meant that people buying the disc pack could have it up and running with good quality software almost as soon as they had bought it.

Torch also manufactures a range of dual and triple processor micros, all of which have a 6502 chip running BBC Basic.

BBC Micro is top of the pops as a prize

A PRIZED possession and a popular prize – that's the BBC Micro.

Hundreds of people throughout the country are working on competition entries to try to win a Beeb.

And St Cuthbert's primary school in Darwen, Lancashire, has already done so.

Its project detailing the applications of micro technology in the classroom won the recent *Lancashire Evening Telegraph* Computer Competition.

More than 40 children aged between eight and 11 collaborated on the project, with most of the work being done during lunch hours and after school.

Most of the pupils were on hand to receive the prize, which included a cassette and a Welcome starter pack, from Christopher Walder, assistant editor of the *Evening Telegraph*.

The school will use the machine to improve language development, mathematics and general knowledge.

Safety

A BBC Micro is also the prize in Micro 83, a road safety competition organised by Devon County Council. Pupils in 200 Devon schools and colleges have been challenged to produce a computer program which could help reduce road accidents.

It is based on a study of a fictitious accident involving a car, a motorcycle and a 12-year-old schoolgirl pedestrian who dies as a result of the accident.

"The entrants may come up with an original idea for a computerised piece of equipment on the car or motorcycle which might have helped prevent the accident", said Peter Gimber, Devon's Road Safety Officer.

"Or they may take an educational approach, using computers to stress road safety messages".

Even the national newspapers are joining in on the craze for the BBC Micro.

The *Mail on Sunday* recently gave away 10 machines to people who placed relevant features of the micro in the correct order of importance, and *The Guardian* lists the BBC Micro as one of the prizes in its "Is the Office Dead" essay competition.

Prowess

Cherry Tree School in Watford is now the proud owner of a BBC Micro, thanks to the programming prowess of two of its pupils.

Hundreds of primary school pupils entered the Win a Computer for Your School competition organised by the *Watford Evening Post-Echo* newspaper.

Youngsters Martin Coupe and Darren Howells won the first prize, which included £50 worth of educational books with their game, "Filling Attack".

Two more of the school's pupils, Matthew Sharkey and Mark Harvey, were among the winners of runner-up prizes.

At Cuthbert's school children receive a BBC Micro from Chris Walder. Picture courtesy the Lancashire Evening Telegraph

IT'S ON THE AIR

ALTHOUGH it is not officially launched until the middle of this month, the BBC has already started a full service of downloading software over Ceefax.

The seven programs are all educational, but plans are under way to include games and utilities shortly.

To pick up the software off the air you need a Model B, an ordinary TV set and a teletext adapter costing £196.

The Micro takes a

A NEW teaching package that could, from the title, add sauce to any lesson is The French Mistress.

Described as a versatile and fully user-programmable learning aid, the program covers an extensive range of French vocabulary subjects.

These include complete phrases and lists of verbs, fully conjugated in five tenses. Each lesson can be used in a variety of learning modes.

Finally there is a test mode where the micro checks speed and accuracy of translation.

New lessons can be created by the student or teacher and stored on cassette for later use.

The package is made up of two cassettes, each

TAKING BBC SOFTWARE TO THE US

A BRITISH company plans to be one of the first firms to market software for the BBC Micro in the United States.

DACC has established a subsidiary in Chula Vista near San Diego in California.

It will produce arcade games and utility programs and will start selling them as soon as the machine is released in the American market.

"The BBC Micro is the Rolls-Royce of computers and Americans can't wait to get their hands on it", claims DACC managing director Derek Ashton.

"Every model sold in the US will be grabbed up and I want to be first on the scene to meet the demand for software".

Ashton's father, Frank, has lived in the USA for 16 years and will run the new subsidiary.

He is already arranging an advertising campaign and setting up a production capability.

DACC claims an immaculate track record for its UK production of programs.

"We've sold more than 2,000 copies of our 747 Flight Simulator package worldwide since last November – and we've not had a single BBC tape returned as being faulty or unsuitable", said Ashton.

He claimed the secret of this success lay in producing the programs "direct from the BBC Micro" with no audio copying involved.

Three BBC Micros are used constantly to churn out the tapes and Ashton says production capability is now 2,000 a month.

"We will use the same methods in the USA", he said. "All our tapes will be produced on the Beeb – virgin tapes. There will be no horror stories for us".

In the pipeline is a utility package which Ashton says will extend the BBC operating system and give a considerable boost to its graphics capabilities.

mistress

covering different areas of vocabulary. Each cassette costs £9.95.

The authors, from Kosmos Software, say they started writing educational material "determined to liberate micros from the incessant threat of space invaders and gulping Pacmen in the interests of some down-to-earth education".

New languages now available

ACORNSOFT LANGUAGES
FORTH
BCPL
LISP

THREE new languages – Forth, Lisp and BCPL – are now available for the BBC Micro.

They turn the machine into a powerful tool for the professional software developer, according to a spokesman for Acornsoft, Acorn's software division.

"The spur that these languages will give to new software development will place the BBC Micro firmly in new computer application areas. These will include expert systems and robot control", he added.

BCPL, widely used in universities, is a flexible structured language that provides an effective high level alternative to assembler.

It is also memory efficient and can handle programs 10 times the size of the machine's resident memory.

Acornsoft says it expects BCPL to be widely used in the development of commercial packages and system software such as screen editors and control systems.

It is available in ROM and comes with a disc containing compiler, screen editor, 6502 assembler and other utilities for £99.95.

Lisp is the fundamental language of artificial intelligence research and is the basis of many expert systems, including medical diagnostic computers.

Forth is a fast compiled language which runs five times quicker than Basic and is suitable for machine control and high speed graphics.

Lisp and Forth come on either cassette (£16.85) or disc (£19.90) with user guides costing £7.50.

HAVE you ever wanted to jump on your micro?

Crofton Electronics has released a replica of the BBC Micro case made of sheet steel. It claims that it is strong enough to support the weight of an eleven stone man – let alone a monitor and two disc drives.

The case is simple to fit and the user only has to transfer the keyboard surround, back label and input/output labels from the original case, using double sided tape, to achieve a cosmetic "lookalike". Cost: £39.50.

New Epson printer

A PRINTER combining both tractor and friction feed has been launched by Epson.

The RX80F/T, costing £350, has dot-addressable graphics, condensed and double width printing, Centronics parallel interface as standard and a print speed of 100 cps.

Are YOU a MUG yet?

PLANS are now well under way for setting up a network of local Micro User Groups – or MUGs for short – dedicated solely to the BBC Micro.

If you want to get in touch with your nearest group – or help in setting one up – please fill in and return the coupon below.

SEND TODAY!

☐ *I would like to become a member of of my local Micro User Group.*

☐ *I would like to help in setting up a local Micro User Group.*

Name ....

Address ....

....

....

Phone No ....

POST TO: MUG, Micro User, Europa House,
68 Chester Road, Hazel Grove, Stockport SK7 5NY.

MAKING THE MOST OF MICRONET

MICRONET stands for Micro Network. But unlike a local area network – which consists of computers sited within a few yards of each other linked together by cable – Micronet covers the whole country, and is run via British Telecom phone lines.

The advantage of using Micronet to get computers talking to each other – and sending mail electronically to each other – is that by the end of this year 92 per cent of the country's phone population will be able to dial into Micronet as a local telephone call. Which makes Micronet a cheap clearing house.

In fact, as an example of this, these words were typed into Micronet in London at 7:40am on Friday July 29.

Transferred

As soon as the editor got into the *Micro User* office at around 9am he turned on the Micronet outfit – an acoustic modem in which you rest the telephone receiver, with a BBC Model B Micro and a display screen – and the words were simply transferred from the phone line onto a printer or a floppy disc.

Anyone with a BBC B – or an upgraded A with an RS432 socket and 32k of RAM – can use Micronet for person-to-person electronic mail.

But more importantly Micronet carries a directory of all those who use the BBC B service.

This means you can find out who all the other Beeb owners are, and can send messages to particular individuals or organisations.

It's like using the phone, but it's generally faster, cheaper, and the person you're addressing doesn't have to be in at the time you're sending your message.

When they next turn on their Beeb and its modem kit they'll discover your mail waiting for them.

It seems daft that with the incredible speed of computing, you still have to wait days or even weeks, for a mail order program cassette to be sent back through the post.

But Micronet carries software down the phone right into your home.

Dial Micronet, browse through what's on offer, select a program like Candyfloss or from dozens of others – there are around 200 changing programs up on Micronet for the Beeb alone – and simply press button f5 on your micro to LOAD the program.

You then SAVE it to tape or disc directly from the phone line.

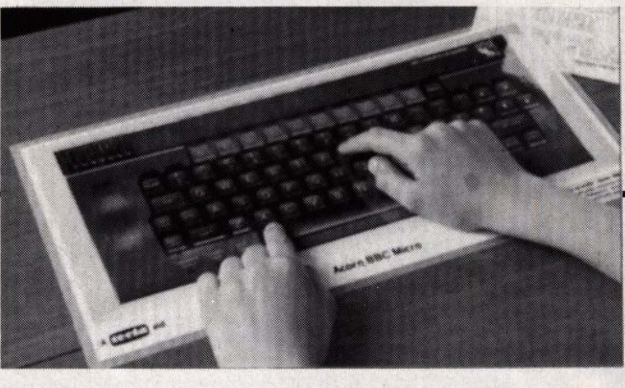
It takes just a minute or two instead of days!

The Micro User is, of course, a user of Micronet. The system allows you to write letters to the Editor using your BBC Micro.

Every month from now on *The Micro User* will be carrying regular updates on what's happening on Micronet.

The current hardware to couple your Beeb costs £59.74. That includes an acoustic modem, power pack, a lead to plug into the RS432 socket and a tape to configure your micro.

Next month *The Micro User* will carry a rundown of users' comments, and a sample of the programs available on Micronet.



Picture the scene

A BBC Micro for £3.99? Well, not quite – but you can buy a laminated photograph of one at this amazing bargain price.

The plastic pix of BBCs and other popular micros are being sold to schools by Computer Training Aids – as training aids. They claim pupils can get keyboard practice without even needing a real machine.

The existing device has limited capacity, but if Sellotape is used to connect to a photograph of a disc drive goodness knows what the outcome would be when you punched in a program!

Keep it safe

AS people do steal microcomputers, Selmor Engineering Industries have designed a simple security device for the BBC Micro.

An upper frame is bonded to the micro. This locks into a lower frame which in turn is bolted to the working surface.

The complete security device costs £26.

Upgrade answer

CLARES latest utility, Replica, should, they claim, end one of the major problems for those upgrading from tape to disc.

Previously many BBC Micro users found it impossible to transfer commercial packages they had bought on tape onto disc.

According to Clares, Replica should allow almost all machine code and Basic programs on cassette to be uploaded onto disc and run.

The copied programs are actually stored as a library on the Replica disc, the maximum being about 10 programs.

Since Replica sells at £9.95, this means a cost of around a pound a program – considerably cheaper than having to re-purchase all your programs in disc format.

★ Look at our ★ buys! ★

Twillstar Computers Limited ★

Out of this world product and prices.

All prices include 15% VAT.

Official orders from Government Depts., Colleges and Schools Welcome.

ACORN DEALER

BBC Service & Information Centre

BBC Microcomputer

All prices include VAT

Model A	£299.00
Model B	£399.00
Upgrade Kit	£51.75
Disc Interface Kit	£109.25
Teletext	£225.00
Dust Cover	£3.95
View Word Processor	£59.00
Word Wise Word Processor	£45.00
Beebcalc ROM Based	£39.00
Speech Synthesizer (The official BBC Speech Syn. Brings in your computer and turns it into a chatterbox)	£54.00
1.2 Operating System	£11.50

Fitting Service Available

NEW IN STOCK

Disc Drives

NEW TEAC SLIM LINE DRIVES

Single Drives Cased	
100K	£175.00
200K	£245.00
400K	£299.00
Single Drives Cased with Power Supply	
100K	£210.00
200K	£279.00
400K	£345.00
Dual Drives Cased with Power Supply	
200K	£379.00
400K	£499.00
800K	£599.00
Single Drives Switchable 40/80 Track	
200K	£255.00
400K	£310.00
Dual Drives Switchable 40/80 Track	
200K	£399.00
400K	£450.00
800K	£599.00
Disc Cable	Single £9.50 Dual £13.50
Disc Operating Manual & Formatting Disc	£10.00
Floppy Discs in packs of 10	
Single Sided 40 Track	£20.00
Single Sided 80 Track	£29.00
Double Sided 80 Track	£35.00
Lockable Storage Boxes	£24.00
Library Storage Boses	£2.00

Dot Matrix Printers

Full Graphics

Free Cable and paper with printers

Shinwa CP80 F/T	£305.00	★ STAR BUY
Epson FX80 F/T	£425.00	
Epson RX80 T	£305.00	
NEC PC 80 20	£375.00	
Parallel Printer Lead	£13.00	
2000 Sheets of Fanfold Paper	£15.00	

Daisywheels

NEW

Juki 6100 Daisywheel with 2K Buffer	£431.00	★ STAR BUY
Silver Reed Printer/Typewriter inc. RS232 Interface (just plugs into your BBC)	£431.00	

Monitors (80 Column)

INC. LEADS

Green Screen Zenith 12"	£89.00
BBC Official 12"	£95.00

Colour Monitor/TV

Ferguson TX	£199.00
Hitachi CPT1471	£245.00

Colour Monitors

Microvitek 14" 1431	£287.00

Word Processing Package

BBC Model B plus Disc/Interface fitted View, Juki Daisywheel Printer, 200K Dual Disc Drives

ONLY **£1,360**

including all cables

Odds

Official Joysticks	£13.00
Compatible Joysticks (Damping control)	£15.00
Micromanagement light pen	£23.00

Cassettes

All BBC compatible

Sanyo DR101	£44.85	
Elftone	£32.20	
Official BBC Cassette Recorder	★ £29.95	STAR BUY
Cassette Recorder Lead	£3.00	

Books

Complete range of books including:

Programming and Interfacing the 6502	£14.40	
Easy Programming for BBC Micro	★ £5.95	STAR BUYS
35 Educational Programs for BBC Micro	★ £6.95	
Further Programming for BBC Micro	£5.95	
Learning to use the BBC Micro	£4.95	
Basic Programming on the BBC Micro	£5.95	
21 Games for the BBC Micro	£5.95	
Games BBC Micro Play	£6.95	

Software

Shuttle (for the BBC)	£14.95
Flight Simulation (747)	£7.95
Gemini Business Software	£19.95

Complete range from Bug-byte, Program Power, IJK, A&F, Acornsoft, including: Missile Base, Castle of Riddles, Chess, Snooker, Starship Command, Countdown to Doom.

SERVICE CONTRACTS TO EDUCATION AUTHORITIES AT DISCOUNT. INSTITUTIONAL AND EDUCATIONAL ORDERS ACCEPTED.

Barclaycard and Access

We can't possibly list all we stock, so pick up the phone and ring 574 5271 and just ask – we'll be pleased to give you our best prices.

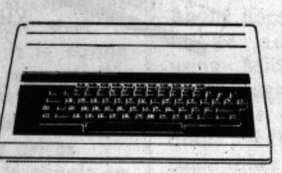
CARRIAGE ON COMPUTERS, PRINTERS ETC £8.00
No delivery charge on large orders.

Twillstar Computers Ltd., 17 Regina Road,
Southall, Middx. Tel: 01-574 5271
Open SIX DAYS A WEEK – 10am-8pm

WATFORD ELECTRONICS

33/35 CARDIFF ROAD, WATFORD, Herts, England
Tel: Watford (0923) 40588/37774 Telex: 8956095 WAELEC

BBC MICROCOMPUTER



BBC Model A – £260
BBC Model B – £346

BBC Micro Model A to Model B UPGRADE Kits:

Upgrade your Model A with our Upgrade Kits and save yourself £ s s s

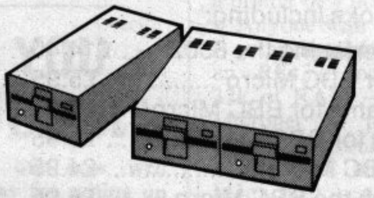
...

BBC1 16K Memory (8 x 4816AP-3 100nS)	**£16.00**
BBC2 Printer User I/O Port	**£6.98**
BBC3 Disc Interface Kit	**£85.00**
BBC4 Analogue I/O Kit	**£6.40**
BBC5 Serial I/O Kit	**£6.70**
BBC6 Expansion Bus Kit	**£6.10**
Complete Upgrade Kit Mod. A to Mod. B	**£43.00**

Dust Cover for BBC Micro

(Protects your expensive Micro from foreign bodies) **£3.95**

DISC DRIVES BBC COMPATIBLE



CS50A – TEAC Cased with own Power Supply, S/S 40 track, 5¼", 100K	**£170**
CD50A – TEAC Twin Cased with own PSU, S/S, 40 track, 5¼", 200K	**£330**
CS50E – TEAC Single Cased with own PSU, S/S, 80 track, 5¼", 200K	**£245**
CD50E – TEAC Twin Cased with own PSU, SS, 80 track, 5¼", 400K	**£475**
CS50F – TEAC Single Cased with own PSU, D/S, 80 track, 5¼", 400K	**£290**
CD50F – TEAC Twin Cased with own PSU, D/S, 80 track, 5¼" 800K	**£575**
MITSUBISHI Slimline – Uncased, double density. Double track, 5¼", 1 Megabytes, track density 96TPI, track to track access time 3mSec. Plugs directly to BBC Micro.	ONLY **£220**
SINGLE MITSUBISHI Slimline – Cased with own PSU, DS/DD, 1 Megabytes. (400k with BBC)	**£275**
TWIN MITSUBISHI Slimline Cased with own PSU, DS/DD, 2 Megabytes. (800K with BBC)	**£535**
Single Drive Cable for BBC Micro	**£8**
Twin Drive Cable for BBC Micro	**£12**
(5 year warranty on VERBATIM Diskettes)	
10 Verbatim Diskettes, 5¼", S/S	**£20**
10 Verbatim Diskettes, 5¼", D/S	**£30**
(2 year warranty on WABASH Diskettes)	
10 WABASH Diskettes, 5¼", S/S	**£15**
10 WABASH Diskettes, 5¼", D/S	**£25**

DFS KIT for BBC MICRO

Complete Kit including Watford's highly sophisticated (Acorn compatible) DFS ROM – ONLY **£85**

PLASTIC LIBRARY CASES for Disc Storage

5¼" (holds 10)	**£2**
8" (holds 10)	**£2.90**

BBC PRINTER GP100A

10" Tractor Feed, 80 columns, 30CPS Normal & Double width Char, Dot res graphics. Parallel Interface standard.

ONLY **£175** (£7 carr.)

SEIKOSHA GP250X:

10" Tractor Feed, 80 columns, 60 CPS, normal and double – width/height characters, 128 characters with true descenders in ROM, 64 user definable characters in RAM (384 bytes) Programmed printing (80 bytes of memory) for storing your own print sequences, dot addressable graphics with repetitive graphics data printing, RS232 and Centronics parallel interfaces standard, paper empty function and buzzer, self test routine. All this for

ONLY **£235** (£7 carr.)

INTERFACES

IEEE	**£54.95**
PET	**£69.95**
APPLE II	**£69.95**
RS232	**£69.95**
BBC – Seikosha Cable	**£11.00**

DUST COVERS

For SEIKOSHA GP80	**£3.75**
For SEIKOSHA GP100/250	**£3.95**

FRICTION FEED Attachment

For SEIKOSHA GP100	**£22**
For SEIKOSHA GP250	**£22**

Spare RIBBON for GP80	**£4.50**
Spare RIBBON for GP100	**£4.95**
Spare RIBBON for GP250	**£5.95**

NEW

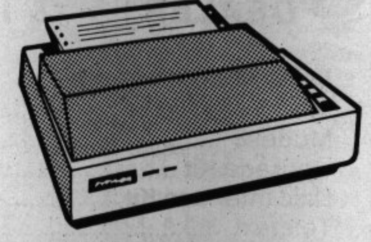
SEIKOSHA GP-700

The Colour Printer that has broken all price barriers.

A 7 colour graphic printer at the price of a standard dot matrix printer. Its unique 4 hammer method enables text and high res graphics to be drawn in 7 basic colours or 30 shades. 7 x 8 matrix. Up to 106 char. per line at 50 CPS. Variable line spacing to 1/120". Tractor or Friction feed. Centronix interface standard.

Special Introductory Offer: ONLY £399

EPSON PRINTERS



Epson RX80

100 CPS, 9 x 9 matrix, dot addressable graphics, condensed and double width printing. Normal, Italic and Elite Characters. Tractor feed, 10" max width, bi-directional, logic seeking. Centronics Interface standard.

ONLY £285 (£7 carr.)

Epson FX80

160 CPS, 11 x 9 matrix, proportional spacing, superscripts, subscripts, dot addressable graphics. Normal, Italic and Elite characters. Up to 256 user definable characters. Down loadable character set. Condensed and double width printing. Full proportional spacing. Four user defined margin positions. Tractor and Friction feed. 10" maximum width Bi-directional, logic seeking Centronics interface standard.

ONLY £388 (£7 carr.)

INTERFACES RX & FX PRINTERS

RS232	**£38.00**
RS232 plus 2K Buffer	**£75.00**
IEEE 488	**£70.00**
Parallel 2K	**£62.00**

RIBBONS

MX80 FT	**£4.75**
MX100	**£10.00**
FX80	**£4.75**
RX80	**£4.75**

DUST COVERS

MX80 FT	**£4.50**
MX100	**£5.25**
FX80	**£4.95**
RX80	**£4.50**

PAPER ROLL HOLDER £12.50

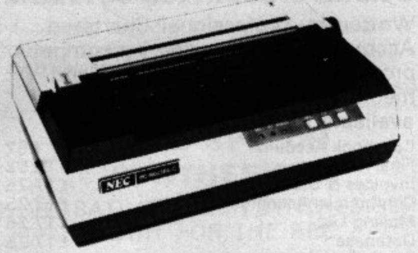
NEW – NEW – NEW

BROTHER 8300 DAISY WHEEL PRINTER/TYPEWRITER

Provides very high quality type in any six interchangeable styles including Italics, Script and 4 conventional typefaces. It is therefore ideal for business use. Portable. Connects directly to a BBC Micro via standard centronics interface or can be used as a stand alone typewriter. As typewriter, it has a built in timing function to measure the operator's speed making it ideal for teaching or invoicing jobs correctly. Friction feed; 11 cps; 12" max width; 5 different colour ribbons. Hard Cover with carrying handle.

ONLY **£399**

NEC PC8023BE-C:



100 CPS, Bi-directional, logic seeking, 80 columns, 7x9 Dot Matrix head, true descenders on lower case, Superscript, subscript and underlining. Single sheet Friction or Tractor feed. Hi-resolution block graphics. All this for only **£320** (£7 carr.)

INTERFACES

APPLE II	**£64.95**
BBC – NEC Interface Cable	**£11.00**
RIBBON	**£6.90**
DUST COVER	**£4.50**

LISTING PAPER

8½" x 9½" Fanfold paper plain or ruled (1000 sheets) **£7** (£1.50p carr.)

15" Fanfold paper (1000 sheets) **£9** (£1.50p carr.)

Teleprinter Roll (econo paper) **£4** (£1.50p carr.)

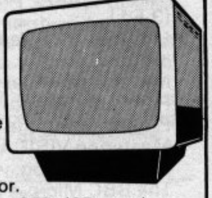
NEW

BBC Micro WORD-PROCESSING Package

A complete word processing package consisting of: BBC Model B, Zenith 12" Green Monitor, Twin 200K highly reliable (1 year warranty) Twin Cased Disc Drives with own power supply, the popular WORDWISE word processor, Watford's own highly sophisticated 62 File DFS interface fitted, the world renowned Brother 8300 Daisy Wheel Printer/Typewriter, Gemini's Beebplot & Beebcalc Spreadsheet Analysis Software tapes, 10 blank diskettes, 500 sheets of Fan-Fold paper, Manuals and all the leads.
All you require is a mains power point to have it up and running (we even supply the 4 way mains socket).

ONLY **£1,350** (carr. £15)

MONITORS



MICROVITEC 1431
14" Colour Monitor, RGB Input. (as used in BBC programmes) FREE Interface Lead. **£249** (carr. £7)

ZENITH 12" Green Monitor. Hi-resolution **£75** (£7 carr.)

CASSETTE RECORDER & ACCESSORIES

Top quality Slimline, portable Cassette Recorder for Computer use. Mains/Battery, operated with counter.

£24.00 (Carr. £1.50)

CASSETTE LEAD
For our Cassette Recorder to BBC Micro **£2.00**

C12 Computer Grade **CASSETTES** in library cases. **40p**

BBC LIGHT PEN KIT

All parts available as per Acorn User's 'SHINE A LIGHT' Light Pen article.

Kit Price: **£9.95**

BBC JOYSTICKS

Two versions available:

SINGLE: Player type	**£7.00** each
TWO Players type	**£11.50** per pair

READY-MADE LEADS for BBC

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6pin DIN to 6 pin DIN Plug (RGB)	**£2.50**
Monitor Lead, BNC to PHONO	**£3.00**

Disc Drive to BBC Micro Power Lead
Single: **£3.00** Dual **£3.75**

PRINTER LEAD 36"

Ready made printer lead to interface BBC Micro to EPSON, SEIKOSHA, NEC, etc., Printers.

ONLY £11

MISCELLANEOUS CONNECTORS

	Plugs	*Sockets*
RGB (6 pin DIN)	**30p**	**45p**
RS423 (5 pin Domino)	**30p**	**40p**
Cassette (7 pin DIN)	**25p**	**65p**
ECONET (5 pin DIN)	**15p**	**25p**
Paddles (15 pin 'D')	**£1.10**	**£2.15**
Disc to BBC Power Plug 6pin	**70p**	
Disc Drive Power Plug 4pin	**60p**	

BEEBPLOTTER

The Unique Graphic Tablet

Watford Electronics' BEEBPLOTTER will work with 32K BBC Micro. Connects to Analogue port. The unique design makes it accurate and simple to use. Attractively finished. The comprehensive booklet supplied describes its use in detail and shows some of the possible applications.

The special features include:-

* Works in all graphics mode and any colour selectable.
* Commands printed on Tablet and On-screen instructions.
* Special routines enable pictures to be quickly loaded from tape.
* Works with all operating systems and ECONET. Tape and Disc versions available.
* Large drawing area (32cms x 23cms).
* Maps, Pictures and Diagrams produced quickly and easily.
* Transparent tablet enables maps and diagrams to be copied directly from books.
* Commands include line, circles and rectangle drawings, infilling, full editing and an easy to use copy and move feature.
* Screen dump routines included for Seikosha and EPSON printers.
* Routines are included to allow user to incorporate pictures in their own programs.
* Designed by a professional teacher with educational uses in mind.

ONLY **£75** (£3 carr.)

13 ROM SOCKET BOARD

Are you wondering where to fit new ROM based software inside your computer in addition to the BASIC, WORDPROCESSOR, DFS, and FORTH ROMS? Then our add-on 13 ROM Socket Board is the answer. Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 4 solder connections to be made. Full instructions are supplied.
Our 13 ROM SOCKETS BOARD enables the User to increase the Sideways ROM capacity from the basic four sockets on the main board upto the full SIXTEEN capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)
The Board gives the User plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.
All essential lines are buffered and the Board meets or exceeds all timings for operation in the BBC Microcomputer.

Supplied ready-built and tested

ONLY £35 (carr. £1)

CMOS RAM for the 13 ROM SOCKET Board

6116-150nS (2K)	**£3.40**
6264-150nS (8K)	**£38.00**

EPROM for the 13 ROM SOCKET Board

	1+	25+
2764-250nS	**£ 4.20**	**£ 3.75**
27128-250nS	**£23.00**	**£19.00**

EPROM PROGRAMMER for BBC MICRO

At last! – the EPROM Programmer for BBC Micro Computer from WATFORD ELECTRONICS that will suit both your pocket and all your requirements. Programs all popular types of EPROMS from 2K bytes up to 16K bytes – **2764 — 2516 — 2532 — 2564 — 2764 — 27128.**
This extremely powerful system is designed for your needs of TODAY & TOMORROW! – BBC Basic programs can be copied into EPROM and subsequently re-loaded faster than from a disc! Suitable for both hobbyist and professional users!

Just look at these features:

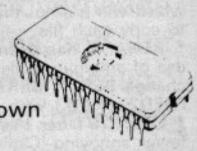
- **COMPLETELY SELF CONTAINED** – Housed in its own sturdy case – Uses its own Power Supply – Connects directly to the 1MHz Bus – Simple and Safe!
- **FULL SOFTWARE SUPPORT** – Comes complete with simple to use ROM based software – Facilities include Varification, Reading, Virgin Testing, Writing, Editing, Saving, Loading and more! NOTE!! – This software does NOT simply comprise hastily prepared routines to get you going, but is a professional, purpose designed applications package.
- **ACORN BUS COMPATIBLE** – Use of the 1MHz connection complies with all Acorn addressing recommendations – That means you can still add-on such things as the TELETEXT, IEEE 488 and PRESTEL Adaptors without having to disconnect everything.

You don't need just any Eprom Programmer – you need **WATFORD ELECTRONICS** EPROM PROGRAMMER System.

ONLY **£78** (£2 carr.)

Price includes software in ROM (and Manual)

NEW – NEW – NEW



Watford Electronics' own

BEEBMON

A ROM based machine code Monitor for the BBC Micro. It enables machine code programs to be debugged and altered easily and quickly. Being a ROM, its Commands are always readily available and occupy no USER memory.
The special features includes facilities like: TABULATE, MODIFY, FILL, COPY, COMPARE, SEARCH (Hex & ASCII), CHEKSUM, DISASSEMBLE, RE-LOCATE, SINGLE STOP, SET BREAK POINTS, SCREEN DUMP ROUTINE, DUMB TERMINAL and many more facilities.

£22

LOGO in ROM

This popular language now available in ROM. Manual included with the ROM.

PRICE: £36.00

WATFORD ELECTRONICS

Continued →

★ NEW ★
BBC MICRO DFS

by
Watford Electronics

This powerful new DFS is fully compatible with ACORN DFS yet has much increased power due to additions, carefully designed to make life easier in normal use. It consists of over 14K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.
* The system can either use the ACORN standard 31 files per disc side or DOUBLE THE CAPACITY to 62 files. The size is selected at formatting time. Copying between discs with different catalogue sizes works perfectly normally.
* A FORMATTING PROGRAM is built in, permitting formatting to 35,40,80 track formats with either 31 or 62 files. Since the formatter is built in to the DFS it can be used without affecting whatever program you are using.
* A DISC VARIFIER is also built in. This checks the internal checksums on each sector to identify any corrupted data. This is extremely useful when saving valuable data as it shows faulty discs quickly and easily. Again it does not affect the program you are using.
* A built in DISC SECTOR EDITOR gives a screen window onto the disc enabling detailed editing of any byte on the disc. This is very useful for recovering accidently deleted files and can save weeks of work.
* A double step mode allows the user of 80 TRACK DRIVES TO READ 40 TRACK DISCS. This mode is software selected for each drive individually, thus allowing a 40 track disc to be copied onto an 80 track one very easily. THIS ELIMINATES THE NEED FOR EXPENSIVE SWITCHABLE DRIVES.
* A WORKFILE function sets the name to be used when the null filename is issued. This allows a program to be edited and repeatedly saved having only typed its name once.
* When using LOAD, CHAIN, etc. it is possible to specify an ambiguous filename. This will result in the first file whose name matches the specification being used. This saves typing the end of a filename that you know is uniquely identified by its first few characters.
* Two commands exist to simplify the transfer of programs from TAPE TO DISC. These load the file to &1200, switch off the disc system and then move the file to its correct load address; thus saving a lot of complicated programming. This command can be used to load files up to 27K5 long.
* An advanced COPY command is included which will prompt the user, requesting whether to copy each file.
* RENAME has been extended to allow the use of ambiguous filenames. This allows you to change BERT1, BERT2, BERT3 to FRED1, FRED2, FRED3 with only one command.
* OPENOUT has been improved to give you fewer annoying 'Can't extend' errors, as it automatically picks the biggest space on the disc in which to put a file. A SPACE command lets you know how much space *COMPACT could create before you waste time doing it.
* 1.75K of RAM can be taken over from the DFS for your large BASIC programs while still retaining LOAD, SAVE and *CAT and other simple commands.
* Comprehensive and clearly written Manual (available separately) gives the user a complete package deal.

Price **DFS ROM** ONLY **£42**

Complete interface kit incl. DFS ROM **£85**

Comprehensive and clearly written manual £7.50

P.S.
We will exchange your existing ACORN DFS for the highly superior Watford's DFS ROM for £35.

Wordwise

Without doubt the most sophisticated piece of software yet written for BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER: ONLY **£34**

ONLY THE BEST AT WATFORD

FORTH ROM for BBC

This superb compiling language now available in ROM. Simply plugs into one of the ROM Sockets. Full FORTH manual included. **£39**

BBC FORTH on Cassette

Follows FORTH-79 standard and has fig-Forth facilities – Provides 260 FORTH words – infinitely extensible – Full screen editor – Allows full use of MOS – Permits use of all graphic modes, even 0-2 (just) – Easy recurtion – Runs faster than BBC BASIC. ONLY **£13**
FREE 70 page manual and a Summary card.

BBC FORTH TOOLKIT

Adds following facilities to FORTH. 6502 Assembler, providing machine-code within FORTH – Turtle graphics enables easy to use colour graphics – Decompiler routines enables versatile examination of your compiled FORTH programs – Full double number set – An example FORTH program and graphics demonstration – Other useful routines – 64 page manual. ONLY **£10.**

LOGO II

This language is very popular in American schools as it is an ideal educational program. It can graphically demonstrate the ideas of defined procedures, sub-routines, loops and even recursive programming. Gives excellent introduction to LOGO language for young and old alike. **£9.95**

DRAW

Has been written to provide a simple but complete system for the introduction of certain programming skills. It is based on a subset of the LOGO language. **£7.75**

DISASSEMBLER

Will generate fully labelled assembly listings of any machine code program. Data is automatically differentiated from code and displayed together with its ASCII equivalent. Assembly listing can be saved in *EXEC format and subsequently incorporated into user programs. In our opinion this is an excellent software at an incredibly low price. **£6.95**

EMULATOR

An extremely powerful and flexible machine code interpreter. Allows you to write and debug machine code as easily as BASIC. Features single step, breakpoint register display, edit modes, etc. **£7.25**

FILER

A powerful file handling program. Filer allows the user to build up, manipulate, store and retrieve data. A very powerful package indeed. **£8.95**

Computer Concept's Firmware

BEEB-CALC £34.

A ROM based spreadsheet program, like wordwise this firmware is fast and simple to use – yet is a powerful spreadsheet analysis program, considerably better than the original 'calc' program – full floating point maths. Works in 40 or 80 column screen modes – variable column widths. Works with either cassette or disc. This ROM coupled with Wordwise can turn your micro into an ideal small business machine.

DISC DOCTOR £22

This ROM contains useful disc utility programs. Enables recovery of any data off the disc including deleted files etc. The full disc editor allows the alteration of any bytes directly on the disc (or in memory), or the loading and saving of any track or sector on the disc. Automatic transfer of programs from tape to disc and vice versa. Also includes a whole host of other useful utilities – string search, function key editing, the ability to format 35, 40 & 80 track discs.

GEMINI'S BUSINESS SOFTWARE

Written by professional Chartered Accountants and coded by competent programmers. Ideal for small and medium sized companies. Now available from stock.

Cashbook Accounts	£52
Final Accounts	£52
Invoices & Statements	£17.25
Commercial Accounts	£17.25
Mailing List	£17.25
Database	£17.25
Stock Control	£17.25
Home Accounts	£17.25
Beebcalc Spreadsheet Analysis	£17.25
Beebplot	£17.25

N.B. All the above Gemini software is on tape. For Disc Based (40/80 track) please add £3.

BOOKS (No VAT on Books)

30 Programs – BBC Micro	£4.95
30 Hour BASIC (BBC Micro)	£6.00
6502 Application Book	£10.25
6502 Assembly Lang. Programming	£12.50
6502 Assembly Lang. Subroutines	£11.80
6502 Software Design	£10.50
ACORN ATOM Magic Book	£5.50
Advanced 6502 Interfacing	£10.95
Assembly Lang. Programming for BBC	£8.95
Assembly Lang. Prog. on BBC Micro	£7.40
BASIC Programming for BBC Micro	£5.95
BBC Micro An Expert Guide	£6.95
BBC Micro ROM PAGING System Explained	£2.95
BBC Micro DFS Manual	£7.50
BBC Micro Revealed	£7.95
BBC Micro Instant Machine Code including Software Cassette	£34.00
Creative Adventure Programs on BBC Micro	£6.95
Creative Graphics on BBC Micro	£7.50
Discover BBC Machine Code	£6.95
Discover FORTH – Osborne	£11.25
Easy Prog. for BBC Micro	£6.50
Further Prog. for BBC Micro	£6.90
FORTH Programming (Sams)	£12.50
Games BBC Computer can Play	£6.95
Getting Acquainted/Acorn ATOM	£7.95
Graphs & Charts on BBC Micro	£7.50
Intro to Micro Beginners Book (3 Ed.)	£9.90
Let your BBC teach you to program	£6.75
Micros in the Classroom	£4.90
Practical Prog. for BBC & ATOM	£5.95
Programming the 6502	£10.75
Mastering VISICALC (Sybex)	£11.95
Structured Prog. with BBC BASIC	£9.50
The BBC Micro An Expert Guide	£7.90
The BBC Micro Book, BASIC, SOUND & GRAPHICS	£7.40

BBC DFS MANUAL

A fully comprehensive disc manual for BBC Micros. All extra commands are included. A bargain at **£7.50** (no VAT).

BBC MICRO ROM PAGING SYSTEM Explained

A comprehensive explanation of the requirements for Sideways ROMs to be used in the BBC Micro. Language and Service entries are explained with their call numbers. This book contains all the information that we have discovered in writing our 16K BBC DFS. A must for all serious users of BBC Micro.

PLINTH FOR BBC MICRO

Protect your micro from the weight of the heavy TV/Monitor. This sturdy plinth is attractively finished in BBC colour. It can be used to support a monitor or a printer. The micro slides underneath comfortably. A must for every BBC Micro owner, specially for those who have to move/open their computer frequently.

Price: £11.95 (carr. £1.50)

PLINTH FOR PRINTERS

Keeps your desk tidy. Place the printer on the plinth and the paper underneath. Finished in BBC colour.

£11.95 (carr. £1.50)

BEEB SPEECH SYNTHESISER

VERSATILE SPEECH SYNTHESISER UNIT FOR THE BBC

Watford Electronic's very own Speech System. Specially designed so that even a novice can make his BBC talk:-

SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!
PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!
ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.
EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!
COMPACT unit – The whole system is built into a small case – easily tucked behind the computer.
HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

TEX EPROM ERASERS

* New Broom for EPROMS *
* TEX Erasers Sweep Clean *

EPROMs need careful treatment to survive their expected lifetime. Rushing it could burn their brains out. So cop-out of this helter-skelter world; take it easy the TEX way and give your chips a well earned break. Cool, gentle and affordable. EPROMPT does it properly.

Two versions available:

● **EPROMPT EB** – The standard version. Erases up to 16 chips. **£32.00**

● **EPROMPT GT** – Erases up to 32 chips. Has an incorporated safety switch which automatically switches off the UV lamp when the Eraser is opened. **£37.00**

TEXTIME

(SOLID STATE ELECTRONIC TIMER)

EPROM Erasers need just half an hour to finish their job. It is the proper erase time for all EPROMs. While the Eraser is busy you may take a break but not for too long without our TIMER on the job. Over erasing can shorten data storage time. TEXTIMER will remember to switch off the lamp and your chips will forget nothing new. TEXTIMER will pay for itself in no time.

ONLY £15.00

SOFTWARE

GAMES

(MICRO POWER)

ADVENTURE	£6.95
ALIEN DESTROYER	£6.95
ASTRO NAVIGATOR	£4.95
CHESS	£6.95
COWBOY SHOOTOUT	£5.95
CAT & MOUSE	£4.95
CROACKER	£6.95
ELDORADO GOLD	£5.95
FOOTER	£5.95
GOMOKU	£4.95
GALACTIC INTRUDER	£6.95
GALACTIC COMMANDER	£6.95
KILLER GORILLA	£6.95
LASER COMMAND	£6.95
MARTIANS	£5.95
MAZE INVADERS	£4.95
MUNCHYMAN	£5.95
MASTERMIND	£4.95
MOONRAIDER	£6.95
MICRO BUDGET	£7.95
REVERSI	£4.95
ROULETTE	£6.95
SPACE MAZE	£6.95
STARTREK	£4.95
SWOOP	£6.95
SEEK	£5.95
TIMETREK	£6.95
ZOMBIES	£4.95

ONE STOP SHOP

LEVEL 9 ADVENTURE GAMES

COLOSSAL ADVENTURE. The classic mainframe game "Adventur" with all the original treasures and creates + 70 extra rooms.

£8.65

ADVENTURE QUEST. Through forest, mountains, desert, caves, water, fire, moorland and swamp on an epic quest vs tyranny.

£8.50

DUNGEON ADVENTURE. The vast dungeons of the Demon Lord have survived his fall. Can you get to their treasure first.

£8.50

EDUCATION Software

JUNIOR MATHS PACK (32K) **£6.95**
Makes learning fun for 5-11 year olds. This package consists of 3 programs (menu driven) that increase in difficulty as your child becomes competent. A very good supplement to standard educational methods.

WHERE? **£6.95**
Do you know WHERE? you are? This well written program, using high resolution graphics offers timed tests on the geography of Great Britain.

WORLD GEOGRAPHY (32K) **£7.00**
Beautifully drawn Hi-Res colour map of the world illustrates and aids this graded series of tests on capital cities and populations of the world.

WORDHANG **£7.80**
(Age 7-13). A word guessing program based on the well known Hangman game. Uses full colour graphics. Complete with 260 words and the facility save your own list of words.

WORLDWISE **£7.80**
(Age 7-15. Two constructive geography programs allowing children to build detailed data bases covering both the UK and the world. Encourages children to refer to atlas and reference books. Save the database anytime.

ANIMAL/VEGETABLE/MINERAL **£4.95**
(Age 7-13). Provides an opportunity for children to teach the computer to differentiate between objects. The program tries to guess the object the child has thought of, using personalised responses like Mmm ... I am thinking.

BRITISH GEOGRAPHY **£6.95**
Teaches a child the locations of Cities and Ports using directional keys.

CAROUSEL **£5.50**
Aimed at junior school age. Sequences of colours and sounds teaches a child to concentrate.

HAPPY NUMBERS **£7.80**
(Age 4-6). No reading skills are required to use this colour graphics number recognition and counting program. Children build patterns of flowers corresponding to figures, quickly learning their significance.

INTRO TO ARITHMETIC **£10.45**
4 programs – Additions, subtractions, multiplications and divisions. Help stage, moving graphics and colours. Worksheet produced at the end of program. (5-7 years old).

WRITING **£5.50**
Full screen demonstration of correct formation of lower case alphabetic characters. Several choice of sequence (5-7 years).

★ NEW ★
CORONA SOFTWARE

Highly acclaimed at the BBC Micro User Exhibition

GEOGRAPHY – FRANCE	£5.50
GEOGRAPHY – GERMANY	£5.50
GEOGRAPHY – SPAIN	£5.50
GEOGRAPHY – ITALY	£5.50

(for Disc based software please add £2.75 to the above prices)

These separate packages teach basic geography of each country – seas, rivers, towns and mountains. There are tests on these which allow for some spelling errors. Praise is given for good results. It utilises BBC's Colour, Graphics and Sound facilities. The Italy package consists of two programs.

MATHS TRANSLATIONS (Age 9-19yrs)
This package explains how to translate Triangles and Quadrilaterals, moving these geometrical shapes on a grid. It goes step by step through the concepts and the matrix calculations involved. Excellent software.

£5.50

COMPONENTS

1.2 ROM	£10.00
4816-100nS	£2.00
2764-250nS	£4.25
27128-200nS	£23.00
6522	£2.95
8271	£38.00
74LS 244	55p
74LS 245	70p
74LS 163	36p
81LS 95	80p
LM 324	30p

CUSTOMER:

How can Watford sell full spec products so cheaply? It's simple! By bulk-buying (direct from the manufacturer where possible), low overheads, smaller margins and our own development team. That's how we have an edge over our competitors.

STACK PAC £6.00

ACORN USER EXHIBITION

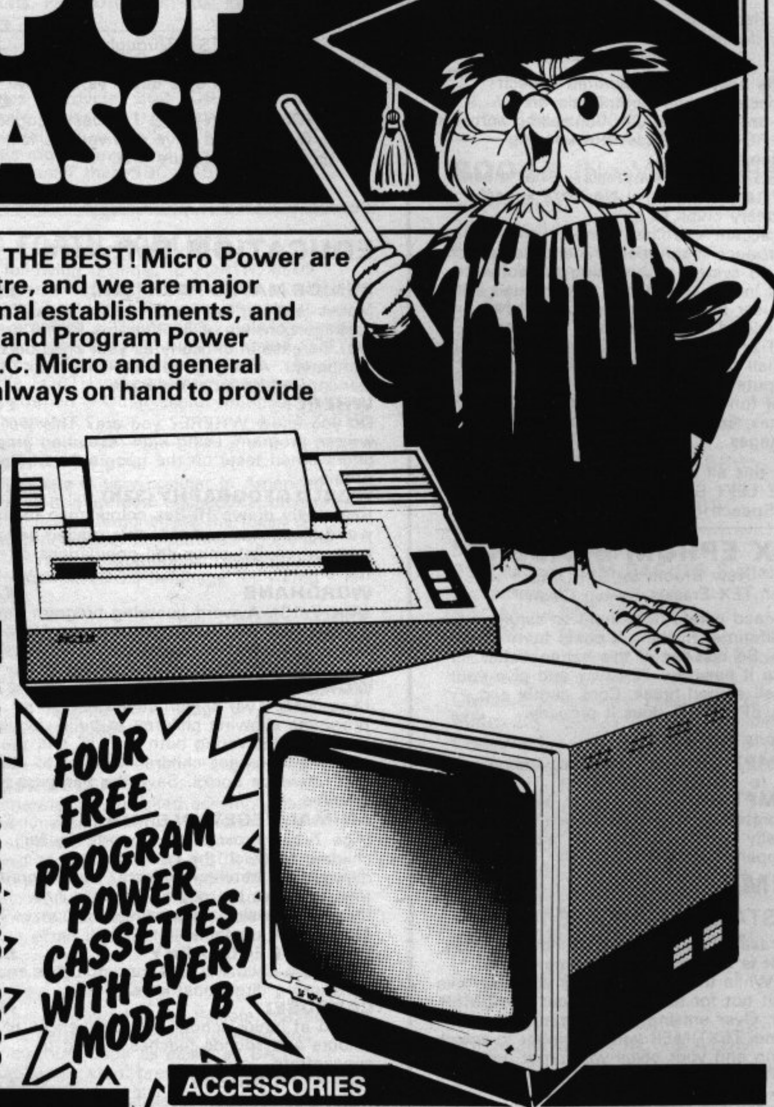
See you in the
FEATURE AREA

WATFORD ELECTRONICS

Dept. BBC, Cardiff Road, Watford, Herts, England.
Telephone: 0923 40588/37774. Telex: 8956095

MAIL ORDER AND RETAIL SHOP. TRADE AND EXPORT INQUIRIES WELCOME.
GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS OFFICIAL ORDERS ACCEPTED.
CARRIAGE: Unless stated otherwise, please add 60p to all cash orders.
VAT: UK customers please add 15% VAT to the total cost incl. Carriage.
SHOP HOURS: 9.00am to 6.00pm. Monday to Saturday.
ACCESS ORDERS: Simply phone: Watford (0923) 50234.

MICRO POWER ARE TOP OF THE CLASS!


FOUR FREE PROGRAM POWER CASSETTES WITH EVERY MODEL B

. . . AND WE'VE WORKED HARD TO BE THE BEST! Micro Power are an official service and information centre, and we are major suppliers to Government and educational establishments, and stock the complete range of Acornsoft and Program Power software as well as a wide range of B.B.C. Micro and general computing books. Our expert staff are always on hand to provide advice and assistance in the relaxed atmosphere of our showroom.

COMPUTERS

BBC Model A	299.00
BBC Model A with 32K	339.00
BBC Model B	399.00
BBC Model B with Disk Interface	P.O.A.

MONITORS

Microvitec 14" colour	286.35
Microvitec 20" colour	343.85
Kaga 12" b & w	123.05

PRINTERS

Epson FX80	458.85
Epson RX80	342.70
Epson MX80 IIIF/T	399.00
Olivetti Spark Jet	399.00
Seikosha GP100A	229.00
NEC PC8023	373.75
Parallel Printer Cable	15.50
Standard 10" tractor feed fanfold paper (per 1000)	9.20
Epson refill ribbons	3.39
Epson MX80 Dust Cover	4.50
Epson FX80 Dust Cover	4.50

DISK DRIVES

TEAC 40 track (100k)	228.85
TEAC 40 track (200k)	424.35
TEAC 80 track (200k)	327.75
TEAC 80 track (400k)	569.25
TEAC 80 track double sided (400k)	396.75
TEAC 80 track double sided double drive (800k)	711.85
TEAC CS55ES 40/80 track 100/200k (switchable)	374.90
TEAC CD55ES 40/80 track 200/400k (switchable)	626.75
TEAC connecting cable	17.25
Acorn 40 track (100k)	264.50
Acorn 80 track double sided double drive (800k)	803.85
Torch 80 track double sided double drive, 64k, Z80 & CPN operating system	897.00
Shugart 40 track (100k)	263.35
additional drive for above (100k)	163.30

ALL PRICES INCLUDE VAT. CARRIAGE FREE FOR ALL COMPUTERS, PRINTER, MONITORS AND DISK DRIVES. CARRIAGE FOR BOOKS AND SOFTWARE - ONLY 55p PER ORDER.

Send an SAE for our complete listing of hardware, software and books. ACCESS and BARCLAYCARD welcome.

WE HAVE PLACED LARGE ORDERS FOR THE ELECTRON: PLEASE 'PHONE FOR AVAILABILITY

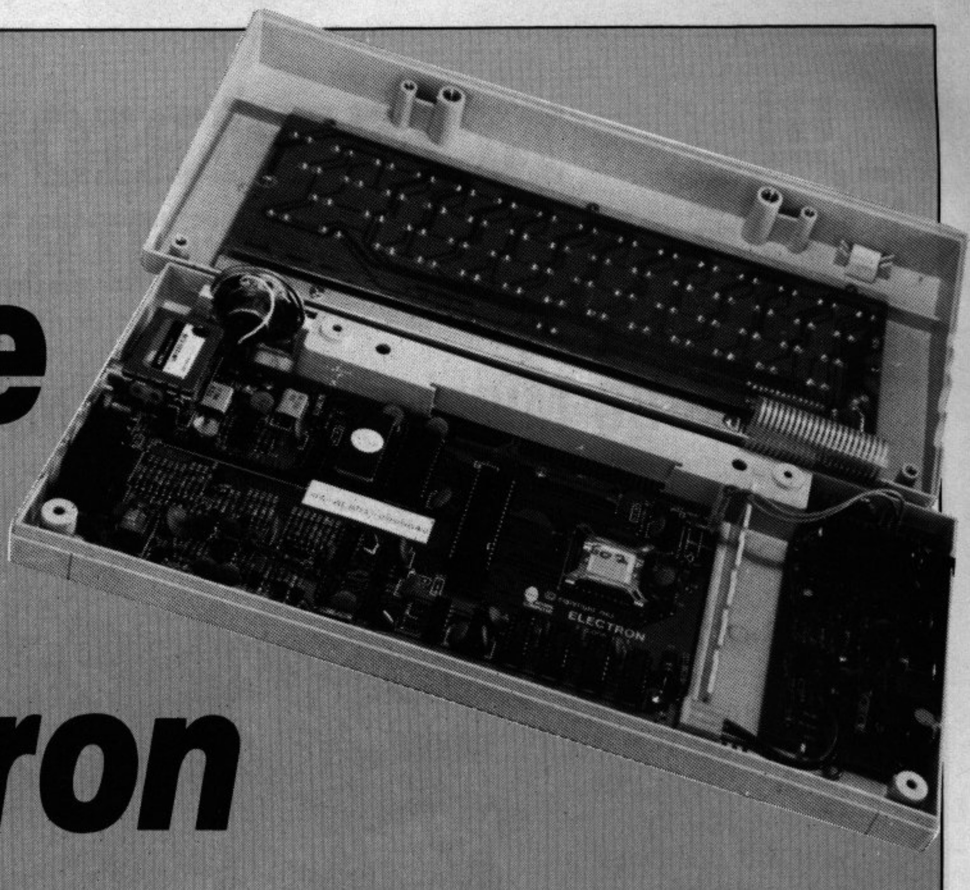
MICRO POWER
Dept.BMU 9
8-8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE
Tel: (0532) 683186 or 696343

ACCESSORIES

Concept Keyboard	79.35
Cable for above	20.70
Acorn Joysticks (pair)	13.00
Canvas cover for BBC	3.95
Vinyl cover for BBC	4.50
Complete upgrade	75.00
VIA chip	4.95
Buffer chip LS244	1.25
26-way connector	2.45
Disk interface (including fitting)	97.00
Econet Interface	70.00
3 C12 Cassettes	2.13
3 C15 Cassettes	2.24
3 C20 Cassettes	2.53
SS/SD Diskettes	2.88
DS/DD Diskettes	4.03
Wordwise	45.43
View	59.80
Speech Synthesiser	55.00
Beebpen	45.94
Kisho cassette recorder	19.95
Acorn BBC Recorder	29.90

MICRO POWER - PUT TO THE TEST WE'LL PASS WITH HONOURS!

Inside the Electron



Mike Cook casts a critical eye over the BBC Micro's baby brother

THE *Micro User* magazine is devoted solely to the BBC Micro, and as such we would not normally review other computers. However, from time to time a computer comes along that is going to have an impact on users of the BBC Micro and we feel that you would like to be kept abreast of these developments. Be assured that your favourite magazine is going to remain devoted purely to your favourite micro.

A chip off the old block – the Electron – is Acorn Computers' entry in the low budget computing market. Pictures of it do not really do it justice as, when you handle one, it has a very slick neat feel.

The keyboard is good quality and is more steeply raked than that of the BBC Micro. It has certainly been professionally styled. Part of its lightweight feel is due to the fact that the mains transformer has been incorporated into the mains plug.

Acorn have decided to slim down the BBC Micro and produce a near-compatible machine. The basic philosophy seems to be, to retain all the software-related features of the BBC Micro, while taking advantage of the latest developments in large scale integration of custom built circuits, by which I mean the ULA.

The one used in their Electron is a whopper! It is the very large square chip you can see on the right of the main computer board.

This type of package is known as a flat pack and it is the first time I have seen one in a home computer. Flat pack packages are normally used in military applications, and as Ferranti do a lot of work for the military, maybe this was the only package they could produce with so many connections.

It is a ceramic package and, while this is more expensive than plastic, it does conduct the heat a lot better. It could be this was the reason for the choice of package as it does run very hot.

The inclusion of this large ULA allows the Electron to be made very cheaply, as one of the major costs in assembling any electronic device is the chip count.

Like any boxer who has slimmed down to a lower weight, it has lost something, in this case most of the built in extras that make the BBC Micro so attractive.

Out goes the analogue input port, the user port and printer interface, the disc interface, the Tube and serial ports.

Also, by putting the ULA to work, a few of the remaining hardware features are not what they were. For example, the sound synthesiser has only one channel and is not as flexible, that is, you do not have the same control over the sound it produces.

As the ULA also performs functions previously performed by the 6845 CRT controller, some of the controller's special features are not implemented, such as the light pen input and the ability easily to scroll sideways.

On the BBC Micro graphics Mode 7 is generated from a separate chip from the other modes, which allows full colour with a remarkable economy of memory. As this chip is missing in the Electron it cannot use this mode.

If you try to call up Mode 7 the Electron will go into Mode 6. In a lot of programs Mode 7 is used for fancy coloured titles and instructions and will still be readable in Mode 6.

However, the control characters are displayed as user-defined and any such characters left over from a previous program will show up. This usually means that a line of text is preceded by a funny squiggle.

The Electron has also lost speed. Whereas the BBC Micro runs at 2mHz, only slowing down to 1mHz to access peripherals, the Electron also performs its memory access at 1mHz.

This is done to save money on the memories, but has the effect of slowing down the whole machine. This is most noticeable when running graphic-intensive programs.

However, the Electron has also gained a few features, the most notable being the single key entry of Basic

→

MYSTERIOUS ADVENTURES

FOR BBC MICROCOMPUTER MODELS A & B*

Join the growing band of Adventurers who are enjoying these absorbing and stimulating programs. Step into another world of Fantasy, Magic, Mystery and Sorcery. Only your wits and cunning can ensure success in these scenarios!

- **WRITTEN IN ULTRA-FAST MACHINE CODE.**
- **SAVE GAME FEATURE.**
- **SPLIT SCREEN DISPLAY.**

1. THE GOLDEN BATON — Venture into a strange province of Sorcery and Evil Magic to recover the Golden Baton, a priceless artifact whose powers are said to bring great Health and Prosperity to the Land.
2. THE TIME MACHINE — As a Newspaper reporter you are sent to investigate the eccentric professor who lives in the old house on the Moors. What is his secret and why is his house now deserted?
3. ARROW OF DEATH (Pt. 1) — A blight has fallen on your homelands, the Baton has become tarnished and now radiates a malevolent aura of Evil. Your mission is clear — trace the source of this Evil and destroy... or be destroyed. This is the first part of an Epic Adventure although each part can be played as a stand alone scenario.
4. ARROW OF DEATH (Pt. 2) — You now have the means to destroy your enemy... but you are far from home and this land is strange to you. Can you cope with the deadly perils which approach you and have you the strength to see your mission through to the final conflict?
5. ESCAPE FROM PULSAR 7 — Alone on a gigantic Space-Freighter... The rest of your crew have died horribly at the hands of a mutated Zoo-Specimen. Your only chance of escape is to reach the Frail Shuttlecraft. But the lurking Monster is hungry and you are the only food it has left...
6. CIRCUS — Your Car has run out of Petrol on a lonely road miles from habitation. As you trudge reluctantly down the road in search of help you are suddenly confronted by an amazing sight... in a nearby field is a Huge Circus tent! But this is no ordinary Circus as you will soon discover..
7. FEASIBILITY EXPERIMENT — Far across the gulfs of time and space, a dying race of super-intelligent beings search the Universe for a Hero to save their existence... At length their thoughts turn to planet Earth. You are chosen to be their saviour in a bizarre scenario where death is a mere thought away...
8. NEW THE WIZARD OF AKYRZ — You are in the Royal Palace. The King beseeches you to rescue his daughter from the evil wizard. If you succeed your reward will be priceless... failure will bring certain death.
9. NEW PERSEUS AND ANDROMEDA — Travel into the realms of ancient mythology. Battle with grotesque monsters and supernatural powers as you search for the hidden secrets of myth and legend.
10. NEW TEN LITTLE INDIANS — This mystery begins with a train journey into a strange country. What secrets are held by the strange country mansion? What meaning is attached to the strange idols? Maybe you will find out if you live long enough...

* Adventures 5-10 inc. require 32K RAM

Each adventure comes attractively packaged for just £10.29 inc.

Available soon for ZX SPECTRUM, ZX81 (16K), APPLE II.

SEND CHEQUE OR P.O. TO:

DIGITAL FANTASIA
24 NORBRECK ROAD, NORBRECK, BLACKPOOL, LANCASHIRE.
Tel: (0253) 591402

From Page 19

commands. But, unlike the competition in this price range, it also accepts commands typed in a letter at a time.

The Electron is also less bulky, making it more portable. But I suspect that the major plus for the Electron will be the price – £199 – and it would not surprise me to see that come down after a year or so.

The Electron comes with two books and an introduction tape. One book is a spiral bound User Guide very much like the BBC one.

However, it is laid out in a more compact way and has an excellent section on assembly language where each machine code instruction is described and explained.

Unfortunately the guide has no index but it does have a six page detailed table of contents at the front.

It is somewhat slimmer than its BBC counterpart as it makes little attempt to teach you how to program. This is done by the second book, "Start Programming With The Electron", by Masoud Yazdani.

This 138 page volume takes you through writing a program as well as using the sound and graphics commands. The book is also to be available separately from book sellers price £6.95.

The introduction tape has programs of similar ilk as the Welcome tape.

Some are straight off this tape and the rest have been culled from other Acornsoft products, like the picture of the island from the Creative Graphics package.

The Electron has a 48 way gold-plated edge connector on the back to allow for expansion. This is protected by a plastic cover.

There are also threaded inserts to allow the add-ons to be mechanically secured and prevent the edge connector from taking the strain, as it does in so many of the competition machines.

This will allow the Electron to be fitted with all the features of the BBC Micro bar Mode 7 graphics.

It is wired in such a way as to let future expansion modules supply the power to drive the Electron so the cumbersome power plug can be disposed of. Unfortunately the documentation makes no mention of the pinout of this connector.

With the obvious exception of the commands concerning the missing hardware, the Electron has almost total software compatibility with the BBC Micro.

Even the commands that will not work, like ADVAL, return numbers and do not give error messages. This means that most programs not relying on Mode 7 and written in simple Basic will run on both machines with the proviso that the Electron will be about 40 per cent slower.

This does not matter for a lot of programs, as most of them use delay loops to slow the machine anyway.

A chip off the old block?

We tested the Electron on several games recently published in the *Micro User* and found that they would all load and run. There seemed to be no effect on games like Nomsim (June), Anagram (May) and Horoscope (April).

However, the arcade-type games did suffer from lack of speed. Deathwatch (March) lacked pace and you could see the discrete movement of the missiles and hear the single notes that made up the firing effect. Likewise, King Kong (April) was very slow and I managed to get a decent score on it for once.

The positioning of the square brackets keys on the Electron is different than on the BBC Micro. They are fitted onto one key and are accessed by shift and control for left and right brackets. This made Space Pilot (June) very difficult to operate as it relies on these keys for movement.

All in all, playing these games was rather like trying ro run through a field of treacle. On the other hand, Spacepods (July) was still quite playable, although the cute tune at the end announcing that you are dead is totally ruined and degenerates into a slow and seemingly random sequence of notes.

Tenpins (July) uses Mode 7 and it did run using the alternative Mode 6. There was no colour, however, and you could not see the ball! Also the sound effects for the falling pins was not as good.

It seems that all the noise/sound effects like crashes and bangs are not as well implemented on the Electron as the BBC Micro.

So who then will be likely to be tempted into buying an Electron? Possibly people who already have a BBC Micro but want a second machine for the children.

Just like the two-car family, the two-computer family is already with us.

Also it could be a useful machine to get for the children if their school has a BBC Micro, as the language it uses will be the same.

People buying a computer for the first time might be tempted to buy the Electron with a view to upgrading it to BBC standards in the future.

I would advise against this course. I think they would be better off getting a bank loan for a BBC Micro now, as the Electron, however expanded, is never going to have Mode 7 graphics or the speed of the BBC Micro.

If you ignore the BBC Micro and just take the Electron on its own merits, its big selling point must be the dialect of Basic it uses, as BBC Micro owners know it is well structured and has many powerful features.

Also, compared to other machines in its class, the Electron is quite fast. The graphics capabilities again are excellent in the price range, but the lack of a printer port without spending extra cash is a big drawback.

The machine seems to be totally upward compatible with the BBC Micro, so any program written for the Electron will run on the BBC.

However, as we have seen, the compatibility does not always work in the other direction.

All in all, the Electron is a machine that is going to cause waves in the world of computers. We will all watch its progress with great interest.

On your benchmarks

JIM NOTMAN compares the Acorn, Pace and Watford systems

I HAVE been comparing version 0.90 of the Acorn Disc Filing System with the two alternatives that are now available – the Amcom DFS, from Pace Software Supplies, and Watford Electronics' DFS 1.00.

The vast majority of software that is available at the present time for disc based BBC Micros uses the standard Acorn 40 track disc format, commands and operating system calls.

Hopefully all new systems that come along will remain compatible to ease the software problems that will otherwise arise.

The only compatibility problem discovered with Watford's DFS was the inability to use files which had a control character in the file name.

On the other hand the Amcom DFS had a number of differences.

***ACCESS** does not exist. Files are locked by preceding the file name by a ~ and unlocked by using ***RENAME.**

***CAT** is no longer alphabetical, so it's not so easy to find the file you are looking for among the increased number files.

***COPY** would not copy files from more than one directory at a time.

***DESTROY** does not exist, though there is a ***CLEAR** command if you want to delete all the files on the disc.

***HELP** is handled very differently. For example, if ***HELP** has a word following it, it will look for a file on the utility disc.

This means that the Amcom DFS eprom must be inserted into the leftmost ROM socket. Otherwise, if you have a ROM like View which has two HELP options (Cmode and Store), you would not be able to have a look at these options.

	Amcom	*Watford*
***FORM**	**(*FORMAT)**	**yes**
***VERIFY**	**no**	**yes**
***CLEAR**	**yes**	**no**
***SYS**	**yes**	**no**
***MLOAD**	**no**	**yes**
***MRUN**	**no**	**yes**
***MOVE**	**no**	**yes**
***WORK**	**no**	**yes**
***HELP SPACE**	**no**	**yes**
***HELP FILES**	**no**	**yes**
***EDIT**	**no**	**yes**

Figure I: Extra commands not in Acorn DFS 0.90

Some of the operating system calls were not handled in the standard way.

For example, in OSGBPB 5, 6 and 7 (8 was missing) the parameter block itself was used to pass information, not a buffer pointed to by the parameter block.

Both new filing systems can greatly increase the number of files that can be held in the directory – 61 in Watford's DFS and 63 with the Amcom DFS, which will also allow longer file names (up to 15 characters).

Both also allow use of non standard disc drives. Watford's will format 35, 40 and 80 track systems. With Amcom the number of tracks and sectors on each track can be set.

Figure I shows the additional commands available for each DFS.

While reviewing the different disc filing systems I got a strong impression that they did not all work at the same speed.

To check this a number of benchmark tests were devised. While not testing every aspect of disc function they do give some indication of the performance of each system.

Listings are given for each benchmark, and the results summarised in Figure II. In the main they consist of loops that test the main functions of the DFS.

**LOAD* and **SAVE* give an indication of how fast a 16k segment of memory is loaded and saved.

**BACKUP* was used in direct mode, as the program space is overwritten using this command. Amcom had the advantage here in that it is possible to define which part of memory may be overwritten thus preserving any program that was present.

PROG1 gives an idea how long it takes to open and close a file. Please note that these were listed using BASIC 1. This means that whenever you see the OPENIN statement here this is the same as OPENUP on a BASIC II machine.

PROG2a to *PROG5* include writing and reading integers, bytes and strings.

PROG6 moves the file pointer through the file.

PROGS 7a, 7b, 8a and *8b* are all concerned with testing the basic ability to have relative files. The beginning of each file was spaced at 260 bytes, to ensure that the test strings stretched over two blocks on the disc.

All of the programs contain VDU7

Check the

```
 5 REM SAVE 16K
10 VDU7
20 S%=TIME
30 *SAVE"RUBBISH"8000 +4000
40 F%=TIME
50 VDU7
60 PRINT"Time ";(F%-S%)/100"
   seconds"
```

```
 5 REM LOAD 16K
10 VDU7
20 S%=TIME
30 *LOAD "RUBBISH" 8000
40 F%=TIME
50 VDU7
60 PRINT"Time ";(F%-S%)/100"
   seconds"
```

```
10 REM PROG1
20 VDU7
30 S%=TIME
40 FORI%=1TO1000
50 X=OPENIN("DATA")
60 CLOSE£X
70 NEXT
```

...for the great disc filing systems race

statements to aid in timing the tests. This was necessary because of a fault found in the Amcom DFS.

At the simplest level it did not allow the BBC Micro's clock to be correctly updated. This meant that the TIME function under-read by a wide margin.

It also appeared to interfere with the normal interrupt sequences. This prevented use of the keyboard buffer in the usual "type ahead" manner.

The strangest effect was that the initial VDU7 command in each loop could last for up to 10 seconds!

All the tests were carried out on the same disc drive – a dual disc 40 track Cumana. Obviously different drives might give slightly different timings, so when looking at the figures it is important to look at the comparative timings.

No.	*Benchmark*	*Acorn 0.90*	*Watford 1.00*	*Amcom*
	***SAVE 16k**	**2.7**	**3.6**	**9.1**
	***LOAD 16k**	**2.5**	**2.4**	**5.7**
	***BACKUP**	**28.0**	**28.0**	**31.0**
1	**OPEN + CLOSE files *1000**	**4.2**	**6.4**	**18 for 10**
2a	**PRINT 1000 numbers**	**15.1**	**10.4**	**49.8**
2b	**PRINT 100 strings**	**59.6**	**45.1**	**209.7**
3a	**INPUT 1000 numbers**	**13.0**	**9.1**	**40.3**
3b	**INPUT 100 strings**	**55.2**	**42.4**	**214.7**
4	**BPUT 1000 bytes**	**4.9**	**4.3**	**13.0**
5	**BGET 1000 bytes**	**4.6**	**4.1**	**9.3**
6	**Move PTR 1000 places**	**2.3**	**2.7**	**9.4**
7a	**Write test relative file**	**60.9**	**45.6**	**274.3**
7b	**Read test relative file**	**56.8**	**44.1**	**273.3**
8a	**Write relative file backwards**	**234.6**	**137.6**	**519.0**
8b	**Read relative file backwards**	**97.5**	**56.0**	*****

** The benchmark for reading the relative file backward would not run with the Amcom DFS, even though it ran with the other two systems.*

Figure II: Comparative benchmark results

out with these programs

```
 80 F%=TIME
 90 VDU7
100 PRINT"Time ";(F%-S%)/100"
    seconds"
```

```
 10 REM PROG2A
 20 VDU7
 30 S%=TIME
 40 X=OPENOUT("DATA")
 50 FORI%=1TO1000
 60 PRINT£X,I%
 70 NEXT
 80 CLOSE£X
 90 F%=TIME
100 VDU7
110 PRINT"Time ";(F%-S%)/100"
    seconds"
```

```
 10 REM PROG2B
 20 A$=STRING$(25,"TESTSTRING")
 30 VDU7
 40 S%=TIME
 50 X=OPENOUT("STRINGS")
 60 FORI%=1TO100
 70 PRINT£X,A$
 80 NEXT
 90 CLOSE£X
100 F%=TIME
110 VDU7
120 PRINT"Time ";(F%-S%)/100"
    seconds"
```

```
 10 REM PROG3A
 20 VDU7
 30 S%=TIME
 40 X=OPENIN("DATA")
 50 FORI%=1TO1000
 60 INPUT£X,A%
 70 NEXT
 80 CLOSE£X
 90 F%=TIME
100 VDU7
110 PRINT"Time ";(F%-S%)/100"
    seconds"
```

```
 10 REM PROG3B
 20 VDU7
 30 S%=TIME
 40 X=OPENIN("STRINGS")
 50 FORI%=1TO100
 60 INPUT£X,A$
 70 NEXT
 80 CLOSE£X
 90 F%=TIME
100 VDU7
110 PRINT"Time ";(F%-S%)/100"
    seconds"
```

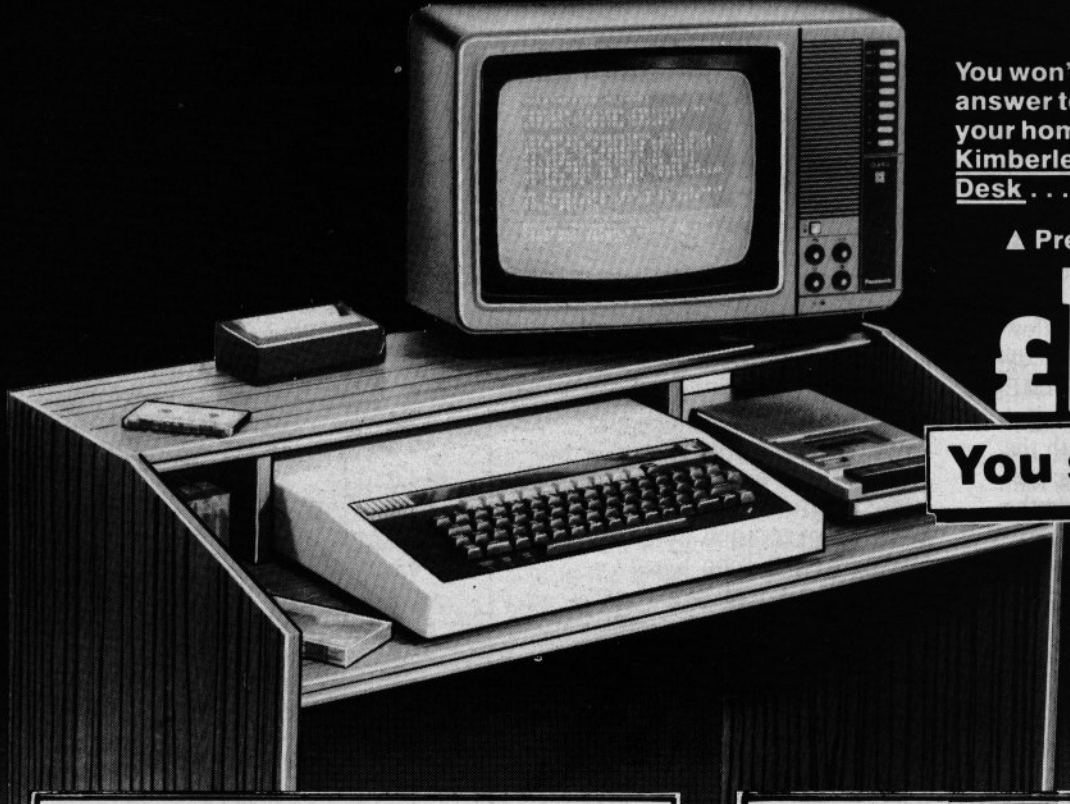
```
 10 REM PROG4
 20 VDU7
 30 S%=TIME
 40 X=OPENOUT("BYTES")
 50 FORI%=1TO1000
 60 BPUT£X,255
 70 NEXT
 80 CLOSE£X
 90 F%=TIME
100 VDU7
110 PRINT"Time ";(F%-S%)/100"
    seconds"
```

```
 10 REM PROG5
 20 VDU7
 30 S%=TIME
 40 X=OPENIN("BYTES")
 50 FORI%=1TO1000
 60 A%=BGET£X
 70 NEXT
 80 CLOSE£X
 90 F%=TIME
100 VDU7
110 PRINT"Time ";(F%-S%)/100"
    seconds"
```

```
 10 REM PROG6
 20 VDU7
 30 S%=TIME
 40 X=OPENIN("DATA")
 50 FORI%=1TO1000
 60 PTR£X=I%
 70 NEXT
 80 CLOSE£X
 90 F%=TIME
100 VDU7
110 PRINT"Time ";(F%-S%)/100"
    seconds"
```

→

How to make your computer feel at home.



You won't find a lower-cost answer to the problem of housing your home computer than the MFI Kimberley Home Computer Desk . . .

▲ Previous Price ~~£59.95~~

£19.95

You save 66%

Keeps keyboard, cassette recorder and TV in one handy unit. Elegantly styled in teak-effect finish. 31¼″ High x 32¾″ Wide x 19¾″ Deep.

Even more storage space for books and manuals. With castors for extra mobility. In teak-style. 31″ High x 32¾″ Wide x 19½″ Deep.

Sherwood Mobile Computer Desk

▲ Previous Price ~~£74.95~~

£29.95

You save 60%

Fold down desk lid gives extra working space and stows away your equipment when not in use. Extra cupboard with two shelves and smart glass door. In teak-style. Castors too! 34″ High x 35″ Wide x 19½″ Deep.

Carmen Micro Computer Organizer

▲ Previous Price ~~£114.95~~

£44.95

You save 60%

Prices are for self assembly units and do not include computer equipment and accessories. All sizes approx. 'Previous price' charged in our ▲ Wembley Park branch for a minimum of 28 days in the last 6 months. Some items may not be available at smaller stores. Advertisement not applicable in the Republic of Ireland. Prices correct at time of going to press 26.7.83

A new MFI Home Computer Desk keeps your computer, your home and your budget all in tune. See them now at your nearest branch.

Phone TELEDATA 01-200 0200 for address of your nearest MFI

Your friends in the furniture business

MFI

Amcom DFS

Reviewed by CHRIS MARTIN

THE advent of the new Disc Filing Systems means that many people may start considering changing their Acorn DFS for one of the newer versions. Others, upgrading to disc for the first time, will need to know what each system offers.

In this article I shall be investigating the Amcom DFS. What exactly are its advantages?

First of all, it offers compatibility. You can either use discs in what they call extended mode or in Acorn mode.

Secondly, it offers an extended mode in which the catalog will hold 63 files on one disc and the filenames can contain up to 15 characters.

In either mode discs are formatted using a built-in command – not a program off disc. *COMPACT, *COPY and *FORMAT can be done without overwriting the program in memory, provided there is enough room left for a disc buffer.

On switching on, or after a hard break, the Amcom DFS will probably be in extended mode. I say probably as this is set by the keyboard links which are usually unmade.

To get it into compatible mode you type *SYS0. In this mode you can catalog, read and write to discs written by the Acorn DFS. The only difference is in the way the catalog and the output from the *INFO command is printed.

Provided the command *SYS0 was issued I had no difficulty in working with all the old discs I have accumulated.

It does seem that printing from the catalog and info commands is slower than with the Acorn DFS. But this may be deliberate so that you can read it before it flashes off the screen.

Unfortunately the change in format of the catalog command puts the files which are not in the current directory on separate lines. If you have a lot of files in different directories, page mode must be set to read the catalog.

Another difference is that files must be named exactly as in the directory with every letter in the correct case.

With Acorn a file called "Freddy" can be loaded as *LOAD FREDDY or *LOAD freddy, In the Amcom DFS either of these will give "File not found". It must be *LOAD Freddy.

There are two commands which Acorn have that do not appear in the Amcom DFS. One is *DESTROY – which is similar in function to *WIPE – and the other is *ACCESS.

In the Acorn DFS it is used to lock and unlock files – to do this in the Amcom DFS you can use SAVE "÷$.FRED" to save the Basic file FRED, locking it at the same time – a very nice touch.

In the manual you are told that you can unlock files using *RENAME ÷$.FRED $.FRED. But you cannot.

This appears to be a bug in the program. To unlock poor FRED you must say *RENAME ÷$.FRED X.FRED and then *RENAME X.FRED $.FRED.

There are two other bugs that I found.

You are told that you can have disc titles up to 12 characters in length. If you try the example given in the explanation of the *TITLE command you will get an error. It will only accept 11 characters or less.

The second bug concerns the abbreviated *RUN command. The command *RUN fsp (fsp means a file specification) can be abbreviated to just *fsp.

If you have a file called FRED in directory U on drive 0 then its full specification is :0.U.FRED.

The Amcom DFS will accept *:0.U.FRED but not *U.FRED, which should also work as the drive is assumed to be 0 if omitted.

Being of a bold – nay, foolhardy – disposition I decided to put several hours work on the line and use the Amcom DFS with Wordwise to write this review.

The first part was saved with the Acorn DFS and the following evening I swapped filing systems to continue. It worked!

But for some time I thought that I had ruined everything by trying to unlock the old file in order to read it. Something

→

From Page 19

```
10 REM PROG7A
20 A$=STRING$(25,"TESTSTRING")
30 VDU7
40 S%=TIME
50 X=OPENOUT("RELFILE")
60 FORI%=1TO100
70 PTR£X=I%*260
80 PRINT£X,A$
90 NEXT
100 CLOSE£X
110 F%=TIME
120 VDU7
130 PRINT"Time ";(F%-S%)/100"
   seconds"
```

```
10 REM PROG7B
20 VDU7
30 S%=TIME
40 X=OPENIN("RELFILE")
50 FORI%=1TO100
60 PTR£X=I%*260
70 INPUT£X,A$
80 NEXT
90 CLOSE£X
100 F%=TIME
110 VDU7
120 PRINT"Time ";(F%-S%)/100"
   seconds"
```

```
10 REM PROG8A
20 A$=STRING$(25,"TESTSTRING")
30 VDU7
40 S%=TIME
50 X=OPENOUT("RELFILE")
60 FORI%=100TO1 STEP -1
70 PTR£X=I%*260
80 PRINT£X,A$
90 NEXT
100 CLOSE£X
110 F%=TIME
120 VDU7
130 PRINT"Time ";(F%-S%)/100"
   seconds"
```

```
10 REM PROG8B
20 VDU7
30 S%=TIME
40 X=OPENIN("RELFILE")
50 FORI%=100TO1 STEP-1
60 PTR£X=I%*260
70 INPUT£X,A$
80 NEXT
90 CLOSE£X
100 F%=TIME
110 VDU7
120 PRINT"Time ";(F%-S%)/100"
   seconds"
```

From Page 25

in Wordwise together with the Amcom DFS makes it impossible to read locked files back into memory.

Every time I tried to load it the disc seemed to go into a loop with the head going back and forth across the surface continually.

I tried to recreate the file by writing a Basic program using BGET and BPUT to copy the (supposedly) ruined file byte by byte.

I then discovered that it didn't seem to like two files open at once. After the first sector it gave the error message: "Disc changed at line 20".

In the end I read it all into memory and then opened the output file and wrote it all out again.

While it was doing this I noticed that while writing the head seemed to be going back and forth across the disc . . . endlessly.

It turns out that this is a characteristic of this filing system. With a bit of patience I set it to load under Wordwise and waited and waited. But it finished loading . . . eventually.

Table I gives the commands available in the Amcom DFS and gives a short explanation of each. There are two new instructions offered and five extra OPTs. The extra instructions are *FORMAT and *CLEAR.

*FORMAT will format a disc using the number of sectors set by *OPT2 and the number of tracks set by *OPT3. The default sectors/track is 10 and the default tracks/disc is 40.

*CLEAR will empty a disc removing all the files from the catalog. It is quicker than reformatting, though formatting is faster on this system (including verify) than with the Acorn utility FORM40.

Further options are *OPT5 and *OPT7 which set up a buffer for use by *BACKUP, *COPY and *COMPACT.

*OPT5 sets the start address of the buffer, so you can set it above the program in memory you want to keep.

*OPT7 sets the length of the buffer. The longer it is, the shorter the copying will be.

*OPT6 allows the information output when a file is read or written to be chosen field by field. For instance, with the command *OPT6,39 (the second parameter must be in decimal) you will get just the directory, filename (always), drive and load address displayed.

***BACKUP**	Makes an exact copy of a disc on a second disc.
***BUILD**	Makes a file from lines typed in at the keyboard.
***CAT**	Displays the names of all the files on the disc.
***CLEAR**	Removes all files from the disc.
***COMPACT**	Moves files to release unused space between them.
***COPY**	Copies a file to another disc.
***DELETE**	Deletes a file from the disc.
***DIR**	Makes another directory the current directory.
***DRIVE**	Makes another drive the current drive.
***DUMP**	Dumps the contents of a file in hex.
***ENABLE**	Must be used before the destructive commands *BACKUP, *CLEAR and *FORMAT.
***EXEC**	Reads lines from a disc file as if they were typed in at the keyboard.
***FORMAT**	Formats a disc.
***INFO**	Displays all information in the catalog about a file.
***LIB**	Changes the current library directory.
***LIST**	Lists a file as text with line numbers.
***LOAD**	Loads machine code programs.
***OPT**	Used as *OPTn where n may be 1 to 7. *OPT1 sets the amount of information printed about a file when it is loaded or saved. *OPT4 sets the auto-boot option.
***RENAME**	Changes the name of a file.
***RUN**	Loads and runs a machine code program.
***SAVE**	Saves a machine code program or a section of memory.
***SPOOL**	Sends all lines written to the screen to a disc file as well.
***SYS**	Changes from compatible (Acorn) to extended mode and vice versa.
***TITLE**	Puts a title on a disc.
***TYPE**	Lists a file without line numbers.
***WIPE**	Deletes a selection of files from a disc.

Table I: Amcom DFS commands

The DFS comes with a utility disc, two manuals, a page of additions and corrections and installation instructions for the disc upgrade kit.

The utility disc contains the Help pages for the DFS. When you type *HELP DFS, it reads a header page off the disc from which you can find out which page the command you are interested in is on.

Typing *HELP n will then display this page with two or three lines explaining each command. A nice touch.

It also contains screen dumps for both the Epson and the NEC printers for each mode from 0 to 5.

The Epson dumps I tried left blank gaps between each strip of the screen it printed and I could see no way to make it work properly. A colleague has since discovered that the Epson LF enable switch must be off.

There is also a program to edit a disc byte by byte. This also allows you to read and write sectors to the disc and to edit memory.

With this utility and a knowledge of the disc format you would be able to recover a file erased in error.

Finally, the utility disc contains a program to allow discs with peculiar titles to be read.

The DFS distinguishes between an Acorn type disc and an extended one by looking at the first bit of the first sector of the disc. If this is a "1" then it takes the disc to be in extended mode.

If the disc has, for instance, a coloured title this bit will be set and the DFS will treat it as extended though it is Acorn.

This utility (Acorniser – the utility disc is extended, of course) tries to break the deadlock.

The manual is very well laid out and I haven't noticed any errors. The section on technical information is much clearer

Watford DFS

Reviewed by JIM NOTMAN

NOT everyone who is lucky enough to have disc drives is entirely happy with the Acorn Disc Filing System. Not even Acorn themselves, judging by the number of different versions of their DFS that seem to be around in addition to the official 0.90 version.

Two new disc filing systems have recently been released that try to improve on the original. I have been looking at the one produced by Watford Electronics to find out what it offers.

It is available either as part of their disc interface kit or by itself as a plug-in sideways ROM. The Amcom DFS comes with a detailed manual, which is more than can be said for the Acorn DFS or Watford DFS.

Incidentally, they give a discount if you exchange your Acorn DFS for it.

Installation is no problem if you already have a disc interface fitted. Simply remove the old DFS and insert the new.

For those of you fitting the whole interface kit you have some work to do.

If you have an issue 3 or older printed circuit board in your BBC Micro – the issue number is printed towards the back on the left hand side of the board – be prepared to cut one of the tracks on the board. You must cut and lift one IC pin and solder a link wire onto that pin before inserting the 10 ICs and the DFS eprom.

On issue 4 and later boards it's more straightforward. Just plug in the chips, divide a link and away you go.

The Watford Electronics DFS was supplied on a 16k eprom, unlike the Acorn DFS which is squeezed onto an 8k eprom.

As a result of this increase in software size you no longer need to have a separate utility disc with the formatting and verifying programs on it. You will find these are included on the eprom, along with some extra commands and utilities.

```
ACCESS <afsp> (L)
BACKUP <src drv> <dest drv>
COMPACT <drv>
COPY <src drv> <dest drv> <afsp>
DELETE <fsp>
DESTROY <afsp>
DIR (:<drv>.) <dir>
DRIVE <drv>
ENABLE
FORMnn <drv>
INFO <afsp>
LIB (:<drive>.) <dir>
MLOAD <afsp>
MOVE <src drv> <dest drv> <afsp>
MRUN <afsp>
RENAME <old afsp> <new afsp>
TITLE <title>
WIPE <afsp>
WORK <fsp>

where fsp = file specification
     afsp = ambiguous file
            specification
      dir = directory
      drv = drive
  src drv = source drive
 dest drv = destination drive
```

Figure I: The HELP DFS

Watford's DFS is able to read discs created on the Acorn DFS. It can even read 40 track discs on an 80 track system. This may well prove rather important to those with 80 track discs as most of the software available on disc at the moment seems to be for 40 track discs.

All the Acorn commands are here, using the same syntax. However, one problem that did arise was that Watford's DFS does not allow control characters in file names. It comes up with the message, "Illegal character".

This is to make it compatible with the latest Acorn DFS.

So if you have some software which, for example, puts teletext characters in the file name – I've just come across one package which does this – you'll have difficulty using that file.

One way around the problem would be to change the filename using the built in sector editor. But this is not an easy task for the novice.

The only other problems arise if you try to use the extra facilities on the Acorn system.

So what are the advantages of Watford's DFS over Acorn's?

A number of people have expressed disappointment at being limited to only 31 files on the Acorn DFS. With the Watford one the maximum is 62.

You must decide when formatting the disc whether you want the large (62 file) catalog or the standard (31 file) format.

However when using a disc with a large catalog on an Acorn system only the first 31 files may be accessed, and part of the catalog may be overwritten if you try to write to that disc.

Other differences are seen in new commands and extensions to the old commands.

So what does the new DFS look

→

and more helpful than Acorn's and the information on the OSGBPB call and OSWORD with A=&7F should be read by everybody who wants to know what is going on.

To conclude, I have found no serious errors in this DFS though there are a number of bugs to be corrected and alterations to be made which were probably overlooked in the rush to get it to market.

The DFS does its job and in most cases – such as cataloging, loading and saving Basic and machine code programs – it is at least as good as the Acorn one.

As I have mentioned, there are one or two blemishes which I expect will have been removed by the next release.

Finally, if you want a disc upgrade and you can't get it from Acorn, it is well worth while considering Pace's upgrade with the Amcom DFS.

If you already have a disc system then it is worth changing to the Amcom chip but perhaps waiting until the next release.

From Page 27

like? On typing *HELP the following appears:

Watford Electronics DFS 1.00
DFS
FILES
SPACE
UTILS

The DFS and UTILS are recognisable from the Acorn system. When used with *HELP they list all the commands – with their syntax – that are available to that filing system.

Typing *HELP DFS displays the DFS commands (see Figure I). Table I summarises those that are familiar to Acorn DFS users.

Table II contains the commands that are new to the Watford DFS. *FORM and *VERIFY were previously available on the Acorn utilities disc but are now in ROM.

To display the utilities available type *HELP UTILS. They are summarised in Table III.

The most interesting utility is EDIT, the disc sector editor. With this you can read and alter any byte of any block of any sector of the disc.

This is useful but you really need to know what you are doing otherwise you may do more harm than good.

The manual recommends taking a backup copy of the disc first before experimenting. It's a very wise precaution!

The main reservation with the editor is that it uses an 80 column mode which makes it difficult to read on an ordinary TV set.

The *HELP FILES command gives you the details of any active files on the disc. These include the channel number, drive, directory, file name, where the pointer is (PTR#), the extent of the file (EXT#) and the file type (whether read only, write only or read and write).

The *HELP SPACE command looks for all the pieces of available space on the disc and tells you how much is left. With this you can see if *COMPACT is going to be helpful.

The *HELP command has also been extended to allow you to ask for the syntax of each command individually.

Other commands available are *FX110, which sets or clears the double step mode, allowing 40 track discs to be read on an 80 track system, and *FX111, which is used to return the drive number of the last CHAIN, LOAD, *LOAD or *RUN command.

***ACCESS**	Locks and unlocks files
***BACKUP**	Copies the whole of one side of a disc onto another
***COMPACT**	Tidies up the disc so that all the spare space is brought together
***COPY**	Copies a file or group of files from one disc to another
***DELETE**	Gets rid of unwanted files
***DESTROY**	Deletes more than one file at a time
***DIR**	Sets the current directory
***DRIVE**	Sets the current drive
***ENABLE**	Must be used before *DESTROY, *BACKUP (and *FORM)
***INFO**	Gives details of load, execution address and length of file
***LIB**	Sets the current library
***RENAME**	Changes the name of a file
***TITLE**	Gives your disc a name
***WIPE**	Deletes more than one file by replying to a prompt for each file

Table I

The calls often used in assembly language to handle file such as OSARGS, OSFIND, OSFILE and OSGBPB are all supported in the standard Acorn fashion, so there should be no trouble with program compatability.

The only manual I have seen is a preliminary spiral bound version, which is generally well written.

There is a useful beginners' section, a guide to indispensible and useful commands, a reference section with all the commands (each on a separate page), and notes on using the filing system from assembler language.

The commands that are not standard or non-standard extensions are all indicated. This would make the manual worth having even if you only have the Acorn system. A number of calls, such as OSGBPB 5, 6, 7 and 8, OSWORDs &7D and &7E, *FX199, which are not documented by Acorn, are documented here. Also included are a list of drive and disc fault numbers.

***FORM**	Formats 35, 40 and 80 track discs
***VERIFY**	Checks that each block on the disc can be read
***MOVE**	Similar to COPY but with a Y/N prompt to each file
***MLOAD**	Similar to *LOAD
***MRUN**	Similar to *RUN but allows files to be loaded, then moved over the disc workspace. Useful if you have cassette based programs you have difficulty relocating.
***WORK**	Sets the file name to be inserted whenever a null file name is used as in SAVE" " or LOAD" ". A boon for the slow typer!

Table II

***BUILD**	Produces a disc file directly from the keyboard
***DISC**	Switches back to the DFS from another filing system
***DUMP**	Hex and Ascii dump of a disc file
***EDIT**	A disc sector editor
***LIST**	Prints an ascii text file with line numbers
***TYPE**	Prints an Ascii text file without line numbers

Table III

Save in one small detail the Watford system is compitable with Acorn's DFS. It has a number of useful extensions which, once you have started to use them, you would rather not be without.

The current advertised price of £42 seems a little expensive until you realise that the software is on a 16k eprom, and there is no need for a utility disc. Documentation, however, is £7.50 extra. Overall a very worthwhile package.

NEW SAME-DAY DELIVERY IDEAS BOOK

OUT NOW! 811 IDEAS FOR YOUR COMPUTER

In the Inmac catalogue of ideas for your computer check to see what is in the latest issue for you:

Cables, cables and more cables! How to order custom-built cables. When to use screened cables. How to choose the right **EIA RS-232** extension cables for your VDU's and how to connect your **Apple, Commodore,** or other micros to **Qume, Diablo, NEC** printers. Compatible cables for connecting new peripherals to your **DEC, Data General, Hewlett Packard, IBM, Osbourne**, and **Tandy computers.**

Lifetime Floppies Read about Inmac Plus — the floppy with a lifetime guarantee! Choose from our range of **100% error-free** disk cartridges, **flag-free** disk packs, each with a 3-year replacement guarantee.

New Ideas! Dozens of exciting new products — many never seen in Europe before now — and lots of helpful hints on getting more from your computer department.

Service and Quality — a promise you can rely on! We promise a **next day** delivery service of our products, a **30-day risk-FREE trial**, and a **12-month** trouble-free quality replacement guarantee.

Send today for your **FREE** catalogue with no obligation to purchase — but be warned: you will want to buy once you have read the Inmac catalogue ideas book!

inmac
Now over 500 cables – and a custom service too.
New! Industry's most versatile 1-Switch, see page 5.
Furniture for the future, see page 11.
This man's job is to replace defective Inmac Plus floppy disks. He has no comp
The Clean-Bit Kit
Disk Head Cleaner
Inmac
INMAC PLUS
TEXPADS
30-day risk-FREE trial. 12 months guarantee. Next day delivery.

FREE! IF YOU USE A COMPUTER
☎ 09285-67551

Send this coupon
to Dept. 327, Inmac (UK) Limited,
18 Davy Road,
Astmoor Industrial Estate,
Runcorn, Cheshire WA7 1PZ.

Name____________________
Company____________________
Address____________________

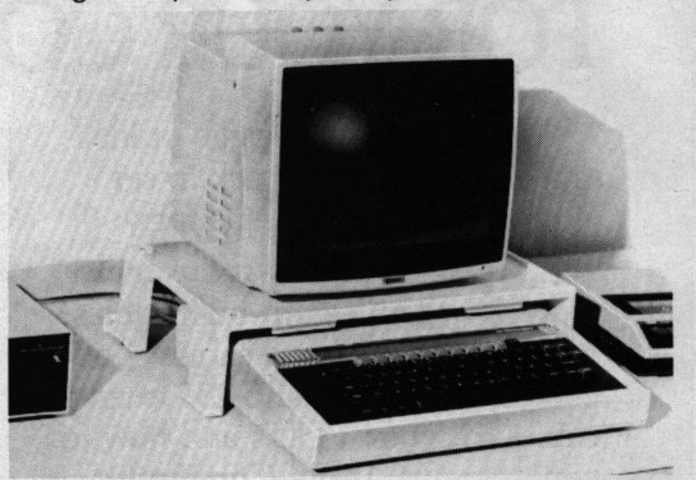
24 hour tel. no.
☎ 09285-67551

the OWL PERCH ©1983

designed specifically for your BBC Micro.

The 'Owl Perch' Stand is a heavy duty, sand-cast aluminium alloy support designed to enable a monitor or television set to be placed above the BBC Computer. It prevents damage to the plastic case of the computer and allows the VDU screen to be positioned at a comfortable viewing angle. The 'Owl Perch' may be earthed to provide screening for the computer.

The top surface of the stand is recessed to prevent the monitor sliding off the stand and prevents liquids or small objects falling onto the computer. It is finished in an attractive cream coloured epoxy enamel and is fitted with rubber feet to obviate damage to table or desk tops. The 'Owl Perch VDU Stand provides ample clearance to prevent overheating. The price quoted is for the single-tier unit but various extras are available including a second tier kit to provide an additional shelf for mounting disc drives, etc., below the VDU.



£35 incl. VAT & p&p (UK)
alternatively, a D.I.Y. Kit!

The 'Owl Perch' is now available in an 'as cast' form. The specification remains the same but the casting requires filing to smooth the corners, etc., and is not painted. The self-adhesive rubber feet are supplied unfitted. The corners are not drilled and tapped for the second tier extension but this can be done at an extra cost of £2.00 plus 30p VAT.

Price £14.00 (plus £6.00 p&p and VAT)

Please allow up to 28 days for delivery.

Details from:

William Broady & Son Ltd., English Street, Hull HU3 2DU.

BBC Micro Users AT LAST . . . The real alternative D.F.S. AVAILABLE NOW!!! FROM

PACE

THE NEW AMCOM DISC FILING SYSTEM

This amazing new disc filing system adds greater flexibility to your BBC Computer. It has two distinct modes which auto select on booting the system.
Mode zero is the standard mode which retains compatibility with presently available software.
Mode one, the extended mode, allows for sixty-three file names per disc, over 100% increase on existing DFS, and also permits the file names to be up to fifteen characters in length providing much greater scope for meaningful file names. In both modes page is set at &1500.
This gives 10% more usable memory then Acorn's DFS, in modes 0, 1 and 2.
If you already have a Disc interface, it is very easy to upgrade, you simply remove the DFS Eprom and replace it with the Amcom DFS Eprom. If not, then it is possible to purchase an entire Disc interface kit (consists of 11 I.C.'s). With this DFS no track cutting is required, and soldering is unnecessary.

NINE NEW COMMANDS ARE NOW AVAILABLE

***Clear**	**Quickly and easily erases an entire disc.**
***Format**	**Formats drive 0 to 3 in either 40 or 80 tracks.**
***OPT2,n**	**Alters the number of sectors per track to n.**
***OPT3,n**	**Alters the number of tracks per disc to n.**
***OPT5,n**	**Sets the start address of the DFS buffer (see OPT7).**
***OPT6,n**	**Provides control over which part of the file spec. will be displayed ie. only display directory and program length, or just display drive and load address etc.**
***OPT7,n**	**Sets the length of the DFS buffer.**
***OPT8,n**	**Allows 80 track drives to read 40 track diskettes.**
***SYS**	**Selects either Acorn mode or Extended mode.**

There is a built-in formatter which will format in either forty or eighty tracks in both modes of operation. This formatter also allows for user definable parameters to be included for the development of software protection.
With this disc filing system a user definable buffer can be used while compacting the disc. This will enable disc compacting to be carried out without overwriting any program in memory. Alternatively a new disc may be formatted without any resident program being overwritten.
This DFS also allows for the use of wildcard characters, using either the # symbol for a single wildcard and the * character for multiple wild characters. (e.g. CHAIN "P*" could be used to chain a program called PRINTER as long as there are no other files whose names begin with P).
Has many friendly features such as assisting in transfer of cassette files to disc. This DFS is totally compatible with Econet etc., and is complete with a utilities disc and comprehensive manual. The utilities disc contains many useful programs including machine language printer screen dumps in all modes, including High Res. (Epson & NEC 8023). It also has a nibble editor to scan discs, read data, edit them, and then write back to the disc.
Also included is an eight way DIL switch which may be used to select the start up options these are:

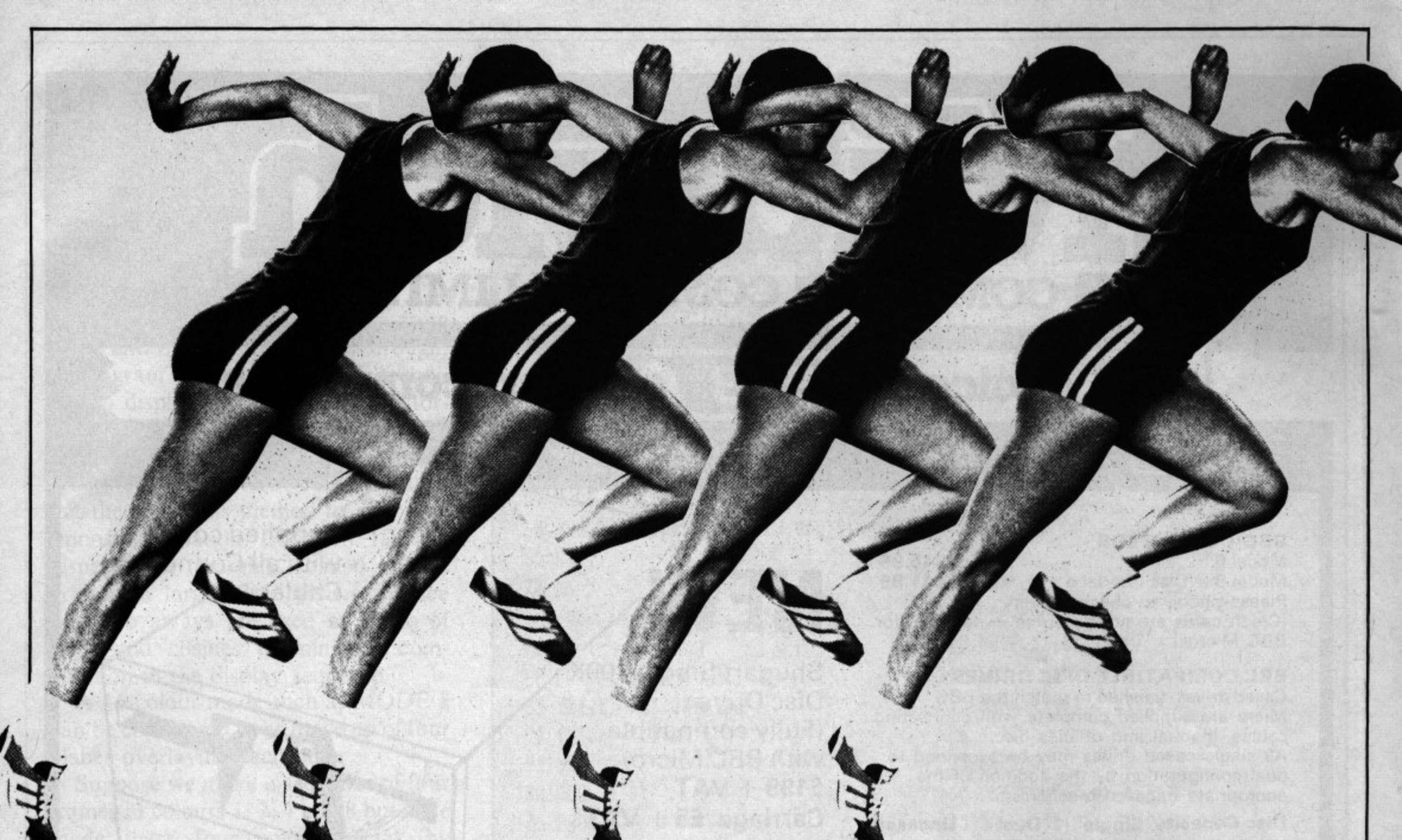
Link 1	**Determines if the system starts up in 40 or 80 tracks.**
Link 2	**Select Acorn or Extended model at start up.**
Link 3 & 4	**Selects type of drive ie. Shugart, Teac etc.**
Link 5	**Select auto-boot or not, on "break".**
Link 6-8	**Select screen mode on start up, ie. mode 0 to 7 etc.**

Buy it with Access

DFS AVAILABLE NOW DIRECT FROM PACE OR CONTACT YOUR LOCAL DEALER. Comes complete with Disc, Manual and full fitting instructions at **£34** inclusive of VAT. Also available as a complete Disc Interface (including DFS and 8 way DIL switch) at **£95** inclusive of VAT.

BARCLAYCARD VISA

PACE SOFTWARE SUPPLIES LTD., 92 NEW CROSS STREET, BRADFORD. 0274 729306 BD5 8BS



Go fast, go smooth go GCOL

If you want to display a graphic moving in a complex manner or perhaps a wire frame drawing rotating in real time then the methods discussed in last month's article are not really practicable.

By ALAN PLUME

One method is to use a palette change to hide the next image while drawing it, then changing the palette to hide the old image and display the new one.

The obvious approach of using a different logical colour for each image will cause problems if adjoining frames overlap and parts of images will disappear (or change colour).

This can be overcome easily with careful use of the logical actions within GCOL and VDU 19 statement. Program I is a simple program to illustrate how it is done.

```
  5 MODE 1
 10 VDU 23;8202;0;0;0;
 15 COL%=7
 20 VDU 19,3,COL%;0;19,1,COL%;0;
 25 C%=1
 30 X%=0
    :Y%=0
 35 GCOL 0,C%
    :PROCdraw(X%,Y%)
 40 VDU 19,3-C%,0;0;
 45 REPEAT x%=X%
    :y%=Y%
 50 C%=C% EOR 3
 55 X%=X%+50
    :Y%=Y%+50
 60
 65 GCOL 1,C%
    :PROCdraw(X%,Y%)
 70 VDU 19,C%,COL%;0;19,3-C%,0;0;
 75 GCOL 2,C%
    :PROCdraw(x%,y%)
 80 UNTIL X%>1000
 85 END
 90 DEF PROCdraw(x%,y%)
 95 MOVE x%,y%
    :PLOT 1,100,0
    :PLOT 1,0,100
100 PLOT 1,-100,0
    :PLOT 1,0,-100
105 ENDPROC
```

Program 1

This is how it works:

Line 15 picks an actual colour to plot in, say white.

Line 20 Makes logical colours 1 and 3 be this colour.

Lines 25-35 assign the value 1 to variable C%, and draws the first image using GCOLO,C%

Line 40 makes logical colour 3-C% black

Line 50 Lets C%=C% EOR 3. (eg, if C%=1 then C% EOR 3=2.)

Lines 55-65 draw next image using GCOL1,C%, the OR operation. Logical colour C% is now black, the overlapping section (if any) will be in logical colour 3, thus not removing the image on the screen.

Line 70 switches the palette and makes logical colour 3-C% black and logical colour C% white. The old image is hidden and the new image appears.

Line 75 draws the old image using GCOL2,C%, the AND operation. This will delete the image leaving over-

→

Midwich

COMPUTER COMPANY LIMITED

1st choice for BBC microcomputers

BBC COMPUTERS

Model B	**£346.95**
Model B + Disc Interface	**£441.95**

Please phone to check delivery
(Credit cards are not accepted in payment for BBC Micros)

BBC COMPATIBLE DISC DRIVES

Cased drives, finished to match the BBC Micro are supplied complete with connecting cables, manual and utilities disc.
All single cased drives may be expanded to dual configuration by the addition of the appropriate uncased mechanism.

Disc Capacity	Single	Dual	Uncased
100K	£195.00	£335.00	£142.00
200K	£235.00	£449.00	£216.00
400K	£290.00	£545.00	£260.00

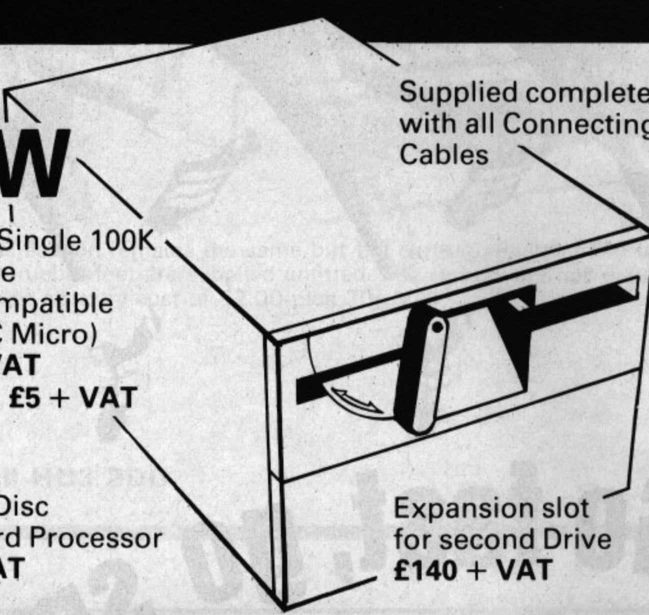
Trade/Quantity discounts are available.

PRINTERS

NEC 8023 Printer (Carriage £10)	**£320.00**

NEW

Shugart Single 100K Disc Drive
(Fully compatible with BBC Micro)
£199 + VAT
Carriage £5 + VAT



Supplied complete with all Connecting Cables

Utilities Disc with Word Processor
£25 + VAT

Expansion slot for second Drive
£140 + VAT

Fast ex-stock delivery by Securicor...

All prices exclude VAT.

Midwich
COMPUTER COMPANY LIMITED

Fitting Service available

BBC UPGRADE KITS

BBCA2B	Complete A to B Upgrade	£44.75
BBC 1	16K Memory	£18.00
BBC 2	Printer/User 1/0 Kit	£ 7.50
BBC 3	Disc Interface Kit only supplied with Disc Drives	£95.00
BBC 4	Analogue Input Kit	£ 6.70
BBC 5	Serial 1/0 RGB Kit	£ 7.30
BBC 6	Bus. Expansion Kit	£ 6.45

All kits are supplied with full fitting instructions.

BBC CONNECTORS

BBC 21	Printer Cable and Amphenol Plug (not assembled)	£ 7.50
BBC 22	User Port Connector and Cable 36"	£ 2.46
BBC 23	Cassette Lead	£ 3.50
BBC 24	7 Pin Din Plug	£ 0.60
BBC 25	6 Pin Din Plug	£ 0.60
BBC 26	5 Pin Din Plug	£ 0.60
BBC 35	Disc 1/0 Cable 34W IDC to 2 x 34 way Card Edge	£12.00
BBC 36	Disc Power Cable	£ 6.00
BBC 44	Analogue Input Plug & Lever	£ 2.25
BBC 66	1 M Bus Connector + 36" Cable	£ 3.50

BBC ACCESSORIES

BBC 45	Joysticks (per pair)	£11.30

12 month "no quibble" warranty on all products

ACORNSOFT FOR THE BBC

SBE03	Business Games	£ 8.65
SBE04	Tree of Knowledge	£ 8.65
SBE02	Peeko Computer Inc Manual	£ 8.65
SBE01	Algebrail Manipulation PK	£ 8.65
SBX01	Creative Graphics Cassette	£ 8.65
SBX02	Graphs & Charts Cassette	£ 8.65
SBB01	Desk Diary Inc Manual	£ 8.65
SBL02	Lisp Cassette	£14.65
SBL01	Forth Cassette	£14.65
SBG01	Philosophers Quest	£ 8.65
SBG07	Sphinx Adventure	£ 8.65
SBG03	Monsters	£ 8.65
SBG04	Snapper	£ 8.65
SBG15	Planetoid	£ 8.65
SBG06	Arcade Action	£10.35
SBG05	Rocket Raid	£ 8.65
SBG13	Meteors	£ 8.65
SBG14	Arcadians	£ 8.65
SBG10	Chess	£ 8.65

ACORNSOFT BOOKS FOR THE BBC MICRO

SBD01	Creative Graphics	£ 7.50
SBD02	Graphs - Charts	£ 7.50
SBD04	Lisp	£ 7.50
SBD03	Forth	£ 7.50

* Please ring for current delivery on Acornsoft products before ordering.

BBC MICRO COMPONENTS

4516 100NS	£ 2.25
6522	£ 3.19
74LS244	£ 0.59
74LS245	£ 0.69
74LS163	£ 0.34
DS3691N	£ 4.50
DS88LS120N	£ 4.50
UPD7002	£ 4.50
8271	£36.00
20 Way Header	£ 1.46
26 Way Header	£ 1.76
34 Way Header	£ 2.06
40 Way Header	£ 2.32
15 Way D Skt	£ 2.15
6 Way Din Skt	£ 0.90
5 Way Din Skt	£ 0.90

BBC SOFTWARE IN ROM.

Wordprocessor "View"	£52.00
1.2 MOS	£10.00

...from East Anglias leading supplier

Delivery charges
Computers/Disc Drives £7.50
Components/Software £0.50
Books/Joysticks £1.00

MIDWICH COMPUTER COMPANY LIMITED
RICKINGHALL HOUSE, RICKINGHALL, SUFFOLK IP22 1HH
TELEPHONE (0379) DISS 898751

From Page 31

lapping areas in logical colour 3.

Repeat sequence from line 45. The operation C% EOR 3 swoops C% from 1 to 2 and vice-versa each time through.

Program II demonstrates this technique in displaying a real time transformation of a square to a star.

As mentioned in last month's article, redefined characters can be used together with this method to give very smooth animation. Program III will display last month's shaded sphere orbiting a larger fixed sphere. Notice that two arrays are used as tables of sines and cosines to minimise computation in the display sequence.

A 16-colour mode such as MODE 2 can be considered to be made up of four planes overlaying each other.

Suppose we make a sequence of four frames in colours 1, 2, 4 and 8 but have made these four colours black by use of the VDU 19 command. We can instantly display the frames in sequence by switching each colour to white and then back to black one at a time.

Using this technique, however, creates a major problem. If any image is drawn over the top of another then "holes" will appear as the animation occurs.

As before this problem can be easily overcome with the use of the OR action in GCOL. The only problem comes in deciding which colours will be white and which will be black in each frame.

Program 4 demonstrates this technique by rotating a grid about a horizontal line.

Lines 20 to 125 define the grid and draw it at prescribed rotated positions with perspective in the colours 1, 2, 4 and 8. Note that this section does not need to be fast.

Line 130 is a delay to let you see all four superimposed images before altering the palette.

Lines 135 to 155 reserve and define the bytes that are used in the palette changing operations for each frame, B% for black and W% for white.

If you want to really understand this technique it is a good idea to sketch out the overlapping colours after the OR actions have been performed and check them for yourself.

Lines 160 to 185 black out all the images then switch on image 1 in white.

Lines 190 to 250 repeatedly take you through the sequence.

Note that the speed can be altered with the parameter to PROCwait at line 210.

```
 10 DATA 0,4,3,0,4,4,1,1,4,0,0,3
 15 DATA 4,-4,-1,1,0,-4,-3,0,-4,-4,-1
    ,-1
 20 DATA -4,0,0,-3,-4,4,1,-1,0,4,3,0
 25 DIM X1%(8),Y1%(8),X%(8),Y%(8)
 30 DIM X2%(8),Y2%(8)
 35 DIM X3%(8),Y3%(8)
 40 FOR I%=0 TO 8
 45 READ X1%(I%),Y1%(I%),X2%(I%),Y2%(
    I%)
 50 NEXT
 55 MODE 1
 60 VDU 29,640;512;23;8202;0;0;0;
 65 R%=1
 70 C%=3
    :VDU 19,3,C%;0;19,1,C%;0;
 75 D%=1
 80 FOR J%=0 TO 8
 85 X%(J%)=X1%(J%)*100
 90 Y%(J%)=Y1%(J%)*100
 95 NEXT
100 GCOL 0,D%
105 PROCdraw
110 VDU 19,D%,C%;0;19,3-D%,0;0;
115 FOR N%=1 TO 100
120 D%=D%EOR 3
125 U%=100-R%
130 FOR J%=0TO 8
135 X3%(J%)=X1%(J%)*U%+X2%(J%)*R%
140 Y3%(J%)=Y1%(J%)*U%+Y2%(J%)*R%
145 NEXT
150 GCOL 1,D%
    :PROCdraw1
155 VDU 19,D%,C%;0;19,3-D%,0;0;
160 GCOL 2,D%
    :PROCdraw
165 FOR I%=0TO 8
170 X%(I%)=X3%(I%)
175 Y%(I%)=Y3%(I%)
180 NEXT
185 R%=R%+1
190 NEXT
195 END
200 DEF PROCdraw
205 MOVE X%(0),Y%(0)
210 FOR I%=1TO 8
215 DRAW X%(I%),Y%(I%)
220 NEXT
225 ENDPROC
230 DEF PROCdraw1 *FX19
235 MOVE X3%(0),Y3%(0)
240 FOR I%=1TO 8
245 DRAW X3%(I%),Y3%(I%)
250 NEXT
255 ENDPROC
```

Program II

```
 10 DIM C(40),S(40)
 20 FOR I%=0 TO 40
 25 R=RAD (I%*9)
 30 C(I%)=COS (R)
    :S(I%)=SIN (R)
 40 NEXT
 50 VDU 23,224,0,3,27,5,45,24,7,8
 60 VDU 23,225,224,208,156,76,252,118
    ,86,255
 70 VDU 23,226,1,6,36,5,42,19,9,0
 80 VDU 23,227,238,254,252,68,252,240
    ,224,0
 90 MODE 1
100 VDU 5
110 VDU 29,640;512;
115 GCOL 0,3
116 PROCsphere
120 R%=200
130 A$=CHR$ 224+CHR$ 225+CHR$ 10+
    CHR$ 8+CHR$ 8+CHR$ 226+CHR$ 227
150 COL%=7
160 VDU 19,1,COL%;0;
170 C%=1
180 X=R%
    :Y=0
190 GCOL 0,C%
    :PROCput(X,Y)
200 VDU 19,C%,COL%;0;19,3-C%,0;0;
210 I%=0
220 REPEAT x=X
    :y=Y
230 X=R%*C(I%)
    :Y=R%*S(I%)
240 C%=C% EOR 3
250
260 GCOL 1,C%
    :PROCput(X,Y)
270 VDU 19,C%,COL%;0;19,3-C%,0;0;
280 GCOL 2,C%
    :PROCput(x,y)
290 I%=(I%+1) MOD 40
320 UNTIL FALSE
330 DEF PROCput(x,y)
340 MOVE x-32,y+32
    :PRINT A$
350 ENDPROC
360 DEF PROCsphere
370 R%=64
    :S%=R%*R%
380 FOR Y%=-R% TO R% STEP 4
390 X%=SQR (S%-Y%*Y%)
400 T%=2*X%
405 FOR I%=-X% TO X% STEP 4
410 IF RND (T%)<I%+X% PLOT 69,I%,Y%
415 NEXT
420 NEXT
425 ENDPROC
```

Program III

→

From Page 33

```
  5 MODE 2
 10 VDU 29,640;512;23;8202;0;0;0;
 15 DIM K%(20),X%(20),Y%(20),x%(20),y
    %(20)
 20 READ N%
 25 FOR I%=0TO N%
 30 READ K%(I%),X%(I%),Y%(I%)
 35 NEXT
 40 DATA 16
 45 DATA 4,2,2,5,2,-2,5,-2,-2,5,-2,2,
    5,2,2
 50 DATA 4,1,2,5,1,-2,4,0,2,5,0,-2,4,
    -1,2,5,-1,-2
 55 DATA 4,2,1,5,-2,1,4,4,0,5,-4,0,4,
    2,-1,5,-2,-1
 60 D%=800
 65 C%=1
 70 FOR A%=22 TO 157 STEP 45
 75 GCOL 1,C%
    :C%=2*C%
 80 C=COS (RAD A%)
    :S=SIN (RAD A%)
 85 FOR I%=0TO N%
 90 Y%=Y%(I%)
 95 y=Y%*C
100 z=Y%*S+6
105 x%(I%)=X%(I%)*D%/z
110 y%(I%)=y*D%/z
115 NEXT
120 PROCdraw
125 NEXT
130 K%=INKEY (200)
135 DIM B% 16,W% 16
140 !B%=&080A0C0E
    :B%!4=&0105090D
145 B%!8=&02030A0B
    :B%!12=&04050607
150 !W%=&01030507
    :W%!4=&02060A0E
155 W%!8=&04050C0D
    :W%!12=&08090A0B
160 FOR I%=0 TO 15
165 VDU 19,I%,0;0;
170 NEXT
175 FOR I%=1 TO 15 STEP 2
180 VDU 19,I%,7;0;
185 NEXT
190 REPEAT
195 FOR F%=0 TO 3
200 G%=F%*4
210 PROCwait(10)
215 FOR I%=G% TO G%+3
220 VDU 19,B%?I%,0;0;
225 VDU 19,W%?I%,7;0;
230 NEXT ,
250 UNTIL FALSE
255 END
260 DEF PROCwait(T%)
265 now=TIME
270 REPEAT UNTIL TIME -now>T%
275 ENDPROC
280 DEF PROCdraw
285 FOR I%=0TO N%
290 PLOT K%(I%),x%(I%),y%(I%)
295 NEXT
300 ENDPROC
```

Program 4

Electronequip

(Authorised BBC Dealer, and service centre)

SPECIAL OFFERS

FREE CASSETTE RECORDER
With every Model B ordered a free cassette recorder will be given (while stocks last).

3" MICRO DISC DRIVE
True floppy disc, very fast. 80K formatted capacity. Disc drive and interface. Cost only £189.95. Drive cost £129.95

ATARI SPECIAL OFFER
Free Atari game cartridge with every computer purchased. Prices 400 – £149.99. 800 – £299.99

SPARKJET PRINTER OFFER
New quiet printer for BBC. Friction and tractor feed 80cps.
Normal £424.35. Only £343.85

TORCH Z80 DISC PACK
800K Dual Disc Drive plus Z80 processor with CMP compatible operating system.
Cost £897.00

Send SAE for details on any of the above items.

BBC 2 BBC Model B Micro Computer	£399.00
BBC 3 BBC Model A Micro with 32K	£333.50
BBC 4 BBC Model A Micro with 32K and VIA	£339.50
BBC 5 BBC Model B with Disc Interface	£469.00
BBC 6 BBC Model A with Econet Interface	£356.00
BBC 7 BBC Model B with Econet Interface	£456.00
BBC 8 BBC Model B with Disc & Econet Interface	£526.00
BBC 21 BBC Model A to B Upgrade	£80.50
BBC 28 Econet Upgrade to BBC	£92.00
BBC 27 Disc Upgrade for BBC B (inc. fitting)	£92.00
BBC 30 BBC 14" Colour Monitor	£287.50
BBC 33 Sanyo SM12N Green Monitor 15MHz	£90.85
BBC 34 Karga K12G Green Monitor 18MHz	£113.85
BBC 35 Karga K12A 12" Orange Monitor	£129.95
BBC 41 BBC Single 100K 5¼" Disc Drive (AND01)	£265.00
BBC 43 BBC Dual 800K 5¼" Disc Drive (AND02)	£803.85
BBC 44 Single Disc Drive (100K) for BBC (Teac)	£211.60
BBC 45 Single Disc Drive (200K) for BBC (Teac)	£269.10
BBC 46 Single Disc Drive (400K) for BBC (Teac)	£349.60
BBC 47 Dual Disc Drive (200K) for BBC (Teac)	£417.45
BBC 48 Dual Disc Drive (400K) for BBC (Teac)	£532.45
BBC 49 Dual Disc Drive (800K) for BBC (Teac)	£693.45
BBC 50 Epson FX-80 160cps Printer + Prop. spacing	£449.65
ATM 2 Acorn Atom assembled 12K ram	£99.95
ATM 26 Atom New Power Supply 1.8A	£9.66
ATM 21 Floating Point ROM for Atom	£21.85

Large stocks of software for BBC and Atom, Business, Games, Educational. Send for comprehensive lists.
All printers, disc drives supplied with all cables.

14" Colour Portable TV/Monitor
This TV/Monitor is not a modified television as many TV/Monitors are, but a 14" TV/Monitor which has been designed to perform both functions. It has RGB and Composite video and sound. An RGB cable for a BBC is supplied as standard.

Cost £259.90
With Remote Control **£279.45**

Trade enquiries welcome

All Upgrades etc., are fitted free of charge and the computer fully re-tested.
Access and Barclaycard welcome.

Large stocks. Prices include VAT. Carriage £1 or £3.50.

ACORN COMPUTER

Electronequip

BBC

36-38 West Street, Fareham, Hants

(0329) 230670

NEW from GAELSETT SOFTWARE
Extended Colour-Fill Graphics
Now Fills Areas of Any Shape

Original ECFG Features :

- ECFG gives you 4 Billion extra area-fill shades for use in any BBC or ELECTRON Modes 0,1,2,4 or 5.
- Written as a machine-code extension to the MOS, the extra ECFG commands are always available for use in any BASIC or Assembler application program.
- Hardware needs no modification. (Not even a ROM)

From the Reviews :

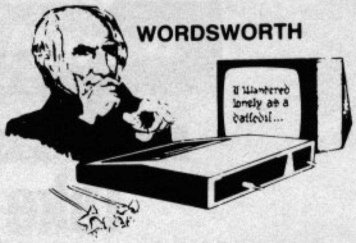
- "Excellent" : Acorn User Magazine
- "It will do what it says" : BBC Micro User
- "A must for serious graphics applications" 'Computers in Schools' : the MUSE journal.
- "Excellent demonstration programs" LASERBUG

New ECFG Features :

- New PLOT commands which let you ECFG-fill any closed area shape — with full machine code speed.
- ECFG can now be used in association with all the plotting statements from PLOT 72 to PLOT 95 inc.
- Completely compatible with non-ECFG software.
- (New version is NOT compatible with BBC MOS 0.1)

Price still £10 inclusive, Mail Order

GAELSETT SOFTWARE (BU)
44 EXETER CLOSE, STEVENAGE, HERTS, SG1 4PW.
(Telephone Stevenage 351224)


WORDSWORTH
I Wandered lonely as a daffodil...

NOW ON
DISC
OR
TAPE

A BBC WORD-PROCESSOR

FOR HOME, SCHOOL, COLLEGE OR BUSINESS
WITH
● BACKGROUND PRINTING ● ON-SCREEN FORMATTING ●
● DECIMAL TAB WITH AUTOMATIC TOTALLING ●
● DEFINABLE PRINTER CONTROL CODES ●

PRINT 500 LABELS, PERSONALISE 500 LETTERS, OR PRINT 260,000 CHARACTERS AT ONE COMMAND – WITH UP TO 9999 COPIES OF EVERYTHING.
OR USE IT WITHOUT A PRINTER FOR YOUR ADDRESS LISTS, APPOINTMENTS DIARY, INDEXES, ETC.

IT MUST BE
WORDSWORTH

TAPE **£17.25** DISC (40 OR 80 TRACK) **£19.50**
FROM YOUR DEALER, OR DIRECT FROM

IAN COPESTAKE
Dept W6, 23 Connaught Crescent, Brookwood, Woking, Surrey, GU24 0AN.
Tel: 048 67 Brookwood 4755
Goods despatched by return.
Printing service available.

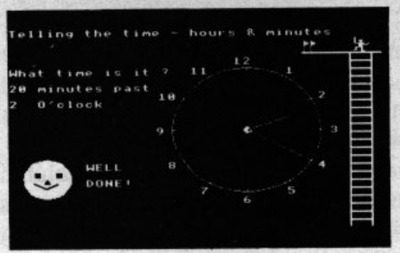
BES Bourne Educational Software

HAPPY NUMBERS

Uses full colour graphics to present attractive images to encourage children to learn their numbers and count. No reading skills required for this very easy to use program.

- Children encouraged through attractive flower collection and happy/sad face responses to their entries.
- Full use of sound reactions, but only with correct answers!
- Incorrect entries show equivalent number, then original entry counts to correct number. Records every entry to identify problem figures.

Suitable for 4-6 year olds and BBC Model B.



```
Telling the time - hours & minutes

What time is it ?
20 minutes past
2  O'clock

WELL
DONE!
```

TIMEMAN ONE

WORLD-WISE

Two programs enabling children to build up fascinating information banks on their favourite geography subjects. Covers both UK and World in a series of 10 categories including, e.g. canals, towns, antiquities, etc. Your atlases and reference books well used as they try to find a river that passes through the Equator, or who built the Parthenon! Features:

- Powerful review/edit facilities to correct entries if required.
- Save and load the data at any time.
- Personalised responses with attractive sound.
- Maintains extensive information on individual childrens' entries.

Suitable for ages 7-15 and BBC Model B.

DISKS NOW AVAILABLE

WORDHANG

Educational version of 'hangman' word game, with full colour graphics and simple but attractive screen layout. Children no longer find learning to spell a chore as they try to keep him alive! Host of attractive features include:

- Lists totalling 260 words to suit reading age/subject. Facility to create and save own lists – ideal for that weekly spelling list!
- Time limit can be set for each guess.
- Monitors individual childrens' performance – time taken, list used, correct/incorrect attempts, etc.

Suitable for ages 5-13 years and BBC Model B.

QUALITY EDUCATIONAL PROGRAMS
". . . already proving very useful and popular . . . envisage being widely used by children."
Mr I. Wilson, Headmaster, Weybridge C.E. Middle School.

AVAILABLE FROM GOOD BBC MICRO DEALERS

BES, Dept BU5, Bedfield Lane, Headbourne Worthy,
Winchester, Hants SO23 7SQ. Tel: (0962) 882474
BBC

TIMEMAN ONE

Children will love learning to tell the time and set the clock with TIMEMAN ONE. Right/wrong answers shown by happy/sad faces and figure climbing up (or down!) ladder. On completion of each stage the figure dances a jig to a tune and plants a flag.
Choice of any one of progressive stages comprising:
● Telling hours ● Telling minutes ● Telling hours and minutes
● Setting hours ● Setting minutes ● Setting hours and minutes
● Attractive use of sound, but level adjustable. ● Children shown the correct answer after each wrong entry, and the chance to try again. ● Features full BES MONITOR – records individual childrens' separate entries. ● Ability and needs easily identified, practice at specific stages can then be chosen.
Ideal for 4-9 year olds and BBC Model B.

ANIMAL/VEGETABLE/MINERAL

Think of an object and see if the computer can guess it correctly! Children love 'educating' the computer as it fails to get the answer right.

- Stimulates fascinating (and educational!) discussions as to the difference between alligators and crocodiles, and whether oil is vegetable or mineral.
- Encourages use of reference books as children try to find the answers to their own questions.
- Maintains full information on individual childrens' entries.

Suitable for ages 7-13 years and BBC Model A and B.

All programs feature explanatory booklet. Postgage and packing FREE. For 24-hour despatch by first-class post, send cheque to BES now!

		Cassette		*Disk*		
Code	*Item*	*Qty*	*Price*	*Qty*	*Price*	*Total*
19	Word-Wise	_____	£8.97	_____	£10.99	£
20	Wordhang	_____	£8.97	_____	£10.99	£
21	Animal/Vegetable/Mineral	_____	£5.69	_____	£10.99	£
22	Happy Numbers	_____	£8.97	_____	£10.99	£
23	Timeman One	_____	£8.97	_____	£10.99	£

I enclose cheque payable to BES

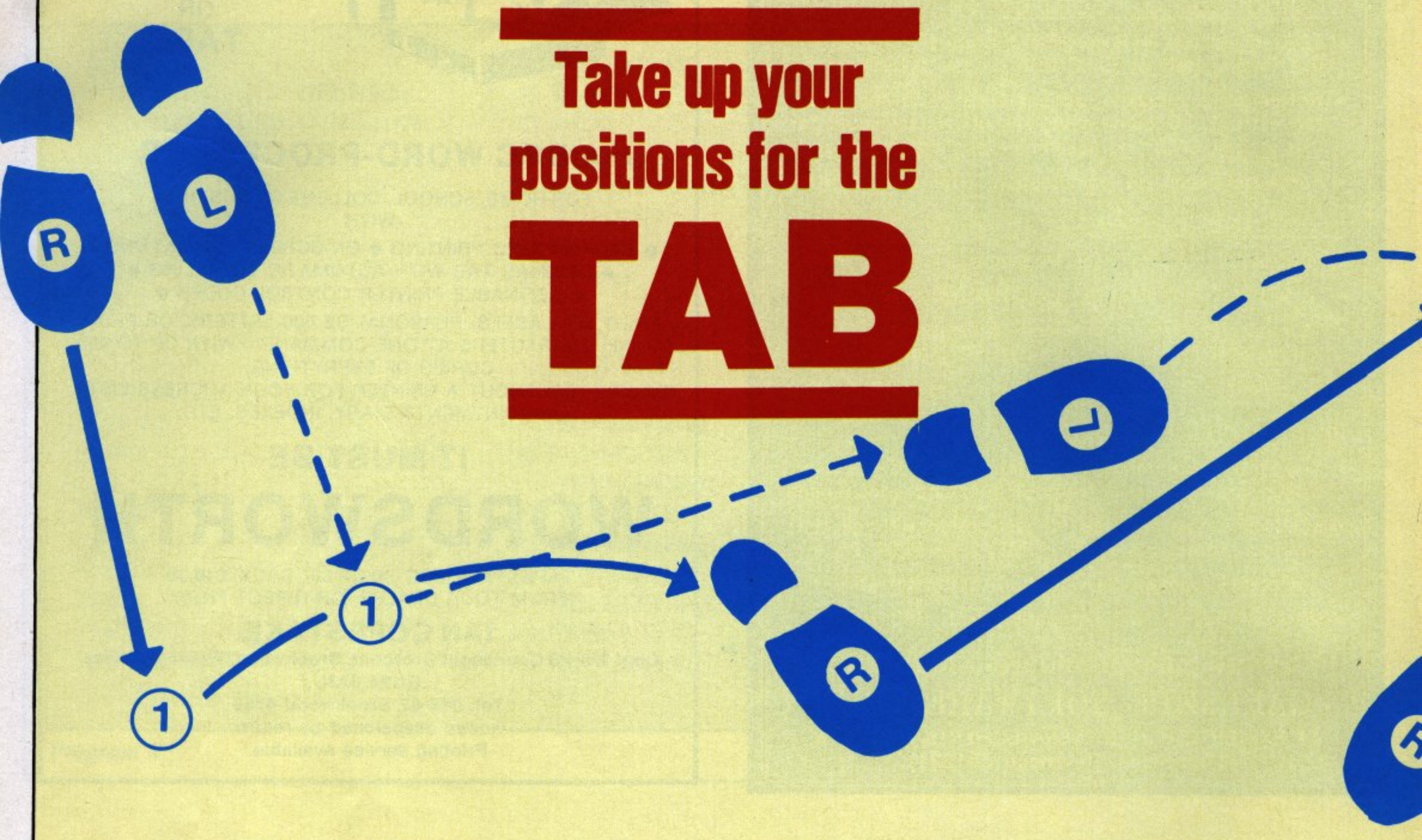
Total: £

Name ....

Address ....

....

Take up your positions for the TAB



THINGS are becoming tough at the offices of The Micro User. The editor has started to come into work earlier, with a drastic effect on the habits of the rest of us. We now have to leave the pub before last orders at lunchtime in order to be back before he arrives.

By NIGEL PETERS

LAST month the editor had me talking about the PRINT statement and what you can do with it. As you've no doubt found by now, it's rather limited. You can print things anywhere you want on the screen using the methods I've described, though it becomes a bit laborious.

Why, you might ask, didn't those awfully clever Acorn people do something to make our lives easier?

Well they did. It's called the TAB( ) statement and with it you can PRINT to anywhere on the screen with ease. You can even override those screen fields I mentioned in the last article.

It's a remarkably easy thing to use. If you want something printed at a particular position on a line, say the inevitable Hello, starting at column 10, you just combine a PRINT statement with a TAB statement:

```
PRINT TAB(10) "Hello"
```

and this will magically print Hello with the H in column 10.

A point to note is that the columns are numbered from left to right across the screen. The first column has the number 0, the second number 1 and so on, each column being the space taken by one letter. This means that column number 10 is in fact 11 spaces from the left of the screen.

Of course the actual number of columns can be 20, 40 or 80 depending what mode you're in at the time – though the final column numbers will be 19, 39, 79 respectively.

The format of the command is that the TAB comes after a PRINT statement. Immediately following the TAB comes the column number you want the printing to start at, the number being enclosed in brackets.

For example:

```
PRINT TAB(15) "Hello again"
```

prints its message with the first letter in column 15, the second in 16 and so on.

Remember that the column number specified is surrounded with brackets and *there is no space between the tab and the brackets*. If you put one in you'll get an error message.

Try:

```
PRINT TAB (20) "You've put in a space"
```

and you'll see what I mean.

Using the TAB statement you can position your text wherever you want it on a line. If the cursor is already beyond the point on a line you select in a TAB command it will just move to the next line and obey you on that.

For example:

```
PRINT TAB(2)"Hello" TAB(9)"Goodbye"
```

puts it all on one line. But:

```
PRINT TAB(2)"Hello" TAB(2)"Goodbye"
```

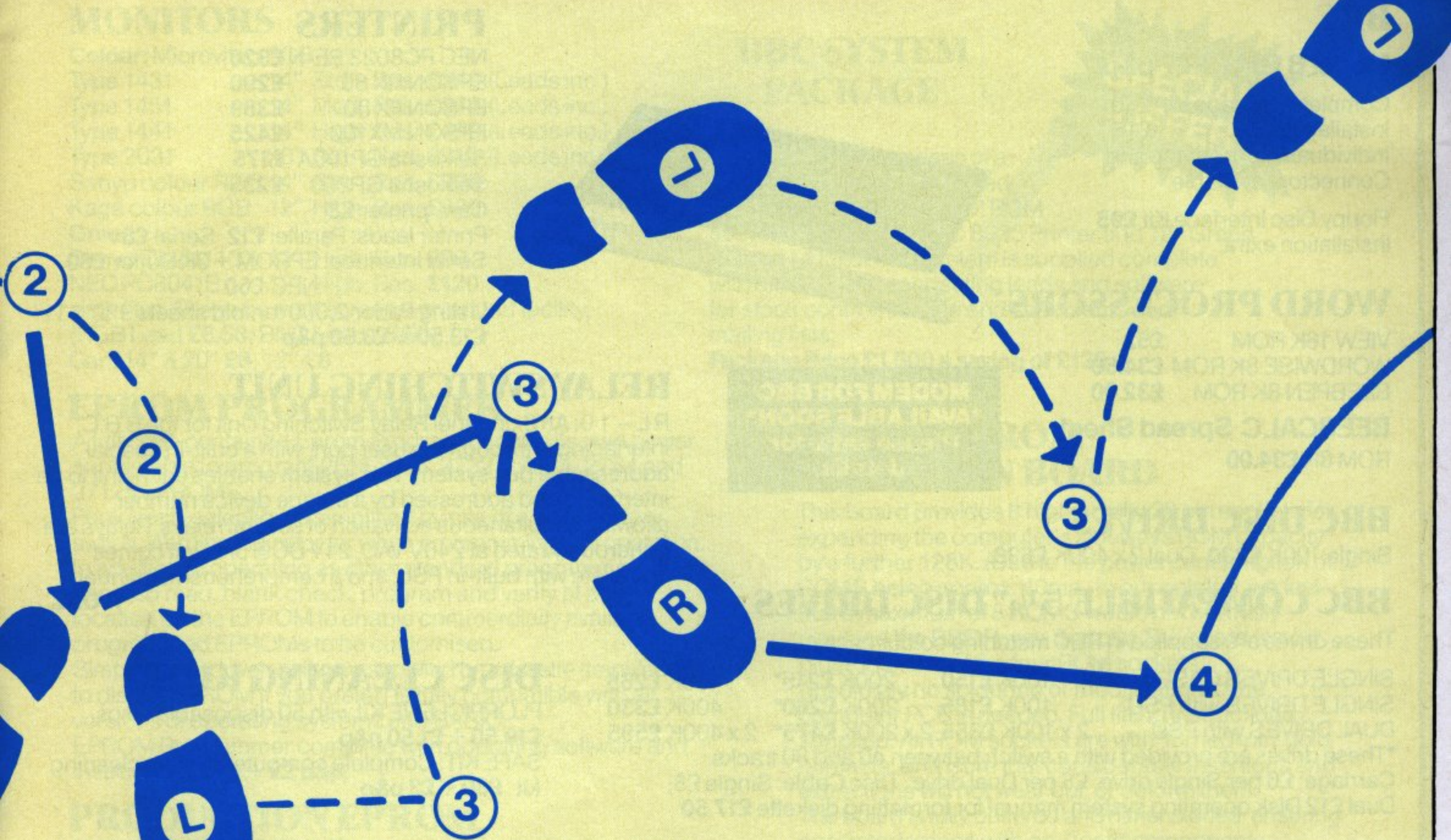
obviously isn't going to work on the same line. Try it and see for yourself that it just moves to the next line.

But again it's all a bit pedestrian. What if you want to print Hello in the middle of the screen?

Do you do something like:

```
PRINT
PRINT
PRINT TAB(15)"Hello"
```

Editing can be easy Part 4



Or is there a simpler way?

There is. You can use the TAB statement in the form:

```
PRINT TAB(P,Q)
```

where P and Q are coordinates, that is numbers describing the screen in terms of its rows and columns.

The P coordinate is exactly what we used before, a number that gives the position across the screen where we want the printing to start. You just pick a column number and it starts printing there.

The new bit is the Q coordinate which gives the number of the line you want the thing to be printed on. The top line on the screen is line 0, the next one down is line number 1 and so on down the screen.

Again the number of the last line will depend on which mode you are in. It will be 24 or 31 (don't forget that the first line is 0).

Suppose you want to say Hello starting at the third column of line 14. You enter:

```
PRINT TAB(3,14)"Hello"
```

and you get Hello printed on the fifteenth line of the screen starting at the fourth column.

If you don't understand that and think it should be the third column of the fourteenth row then you've not allowed for the fact that the first lines and columns have the number 0.

By now it's fairly clear that using the TAB and the PRINT statements together you can put things anywhere you want in the screen. You tell the micro where you want it and it will print it there, overwriting any previous bit of display. The cursor then appears on the next line, ready for action.

As has been seen in an earlier example, you can use more than one TAB with a PRINT, so one line can put stuff all over the screen if you want.

For example:

```
PRINT TAB(11,11)"Hello"
TAB(17,14) "again"
```

You'll probably realise that there's not much point in putting punctuation marks after the TAB to influence the display. After all, you can get what you want where you want by specifying the right coordinates without the bother of punctuation.

However, if you do put punctuation marks in what is to be printed they are obeyed just as if it were a normal PRINT command.

For example:

```
PRINT TAB(8,8)"Hello","again"
```

is not the same as:

```
PRINT TAB(8,8)"Hello";"again"
```

or:

```
PRINT TAB(8,8)"Hello"'"again"
```

But this is of interest only to pedants – it's not really necessary if you use TAB to its full extent.

So by using PRINT,TAB and a little thought you can display stuff all over the screen easily and clearly. Nearly all the programs you write will print something to the screen, and the screen layout is a good guide to the skills of the programmer.

Using TAB you can produce clear, easily interpreted, user-friendly displays with very little effort in terms of the rewards gained.

Which is the exact opposite of my relationship with the editor – a lot of effort for little reward.

Technomatic Official BBC Dealer

01-452 1500 01-450 9764 01-450 6597 Telex: 922800

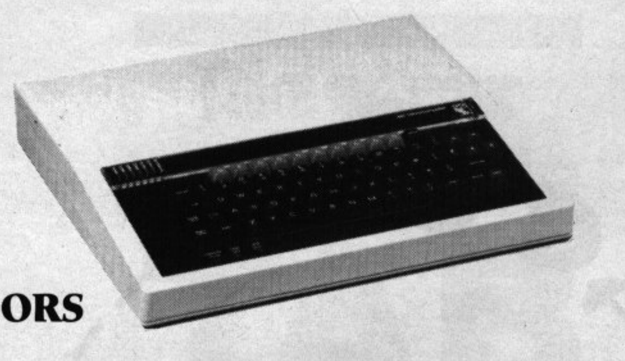
BBC

Model B £347 + £7 p&p

Complete Upgrade Kit	**£50**
Installation	**£15**

Individual Components and Connectors available.

Floppy Disc Interface Kit **£95**
Installation extra.



WORD PROCESSORS

VIEW 16K ROM	**£52**
WORDWISE 8K ROM	**£34.50**
BEEBPEN 8K ROM	**£32.00**

BEEBCALC Spread Sheet
ROM 8K **£34.00**

MODEM FOR BBC
AVAILABLE SOON
Please write for details

BBC DISC DRIVES

Single 100K **£230** Dual 2 x 400K **£699.**

BBC COMPATIBLE 5¼" DISC DRIVES

These drives are supplied in BBC matching colour cases.

SINGLE DRIVES CASED	100K **£150**	200K **£215***	400K **£265**
SINGLE DRIVES with PSU	100K **£185**	200K **£260***	400K **£330**
DUAL DRIVES with PSU	2 x 100K **£355**	2 x 200K **£475***	2 x 400K **£595**

*These drives are provided with a switch between 40 and 80 tracks.
Carriage: £6 per Single drive; £8 per Dual drive. Disc Cable: Single £8, Dual £12 Disk operating system manual for formatting diskette **£17.50**

PRINTERS

NEC PC8023 BE-N	**£320**
EPSON RX 80	**£290**
EPSON FX 80	**£389**
EPSON MX100	**£425**
Seikosha GP100A	**£175**
Seikosha GP250	**£235**

Carr./printer **£8**
Printer leads: Parallel **£12** Serial **£8**
Serial Interface: EPROM + 2K Buffer **£60**
NEC **£60**
Listing Paper 2,000 fanfold sheets 9½" x 11"
£13.50 + £3.50 p&p

RELAY SWITCHING UNIT

RL-10: An 8 channel Relay Switching Unit for the B.B.C. Interfacing is through the user port, with a built-in special addressable bus system. This system enables each unit to be interfaced and addressed by a unique device number, allowing simultaneous activation of several relays. Relays are generously rated at 240V VAC, 24V DC@ 5A. Unit comes complete with built-in PSU, and a comprehensive manual.
P.O.A.

DISC CLEANING KITS

FLOPPICLENE Kit with 50 disposable discs
£19.50 + £1.50 p&p
SAFE KIT: Complete computer system cleaning kit **£30 + £3 p&p**

ELECTRON

Please phone for availability.

TORCH Z-80 PACK

For little more than the cost of an 800K disc drive, you can now considerably extend your BBCs capabilities. The twin drives, together with the Z80 card, gives you 64K of memory and includes a database, word processor etc. Comes complete with manuals, CP/N Operating System, Demonstration & Utility programs etc. The system is fully compatible with CP/M* thus allowing the use of professional business software. **£780 + £8 p&p.** Special offer from Torch: free software worth £1000, for a limited period only and subject to availability.
*CP/M is a trademark of Digital Equipment.

CASSETTE RECORDER

Sanyo DR101 Data Recorder **£39**
BBC Recorder **£28**
Datex Slim Line Recorder **£20**
Hi quality cassette lead **£3**
Audio Digital Cassette C12 **1 for 50p 10 for £4.50**
Hobbit Floppy Tape System
(High Speed Cassette Recorder)
Average Access Time 22 seconds; 101K Byte/ Cassette. Fully built, boxed and tested. Just plug in and ready to use. **£135 p&p £3.**

SOFTWARE

Full range of *Acornsoft* including the new programs:

PROGRAM POWER

CROAKER	**£6.90**	DANGER! UXB	**£6.90**
KILLER GORILLA	**£6.90**	CHESS B	**£6.90**
GALACTIC		PHYSICS	**£6.05**
COMMANDER	**£6.90**	CHEMISTRY	**£6.05**
ALIENSWIRL	**£6.05**	ADVENTURE	**£6.90**
LASER COMMAND	**£6.90**	ELDORADO GOLD	**£6.05**
ASTEROID STORM	**£6.90**	DRAW	**£8.65**
ESCAPE FROM MOONBASE ALPHA			**£6.90**

GEMINI BUSINESS SOFTWARE

Database, Mail List, Beebcalc, Stock Control, Beebplot, Home Accounts Cassette **£17.25 ea.** Disc **£20.25 ea.** Special Offer 3 for price of 2. Cash Book, Final Accounts **£52.00 ea.** Cash Book and Final Accounts together **£82.00.**

SMARTMOUTH

WITH AN INFINITE VOCABULARLY.

A ready built, self-contained speech synthesiser unit, allowing the creation of any English word, with both ease and simplicity. This allows the use of speech synthesis to spread throughout the whole spectrum of computer application, and is helped by SMARTMOUTH's economy in memory usage – typical words using 5-10 bytes. No specialist installation required – no ROMS, simply plugs into the user port. Putting speech into programs is simplicity itself. (Has Aux. audio output socket). SMARTMOUTH is supplied with demo and development programs on cassette, and full software instructions. **£37 + £2 p&p.**

TECHNOMATIC LTD

MAIL ORDERS TO: 17 BURNLEY ROAD, LONDON NW10 1ED
SHOPS AT: 17 BURNLEY ROAD, LONDON NW10
(Tel: 01-452 1500, 01-450 6597. Telex: 922800)
305 EDGWARE ROAD, LONDON W2

TECHNOMATIC
We specialise in EXPORT orders. Carriage at cost.
Orders from Schools, Colleges, Educational Departments and Government Establishments are always welcome.
For fast delivery quote your Access or Visa number.
ALL PRICES EXCLUDE V.A.T.

TECHNOMATIC SPECIAL SUMMER OFFER

Call in or phone between August 22nd and 31st for special summer discounts.

MONITORS

Colour: Microvitec RGB

Type 1431	14"	Std. Res.	**£249** (Leads inc.)
Type 1451	14"	Med. Res.	**£374** (Leads inc.)
Type 1441	14"	High Res.	**£499** (Leads inc.)
Type 2031	20"	Std. Res.	**£319** (Leads inc.)
Sanyo colour RGB	14"	Std. Res.	**£220**
Kaga colour RGB	12"	High Res.	**£399**
Green			
Sanyo DM8111CX	12"	High Res.	**£99**
NEC PC8041B	12"	High Res.	**£120**

High Res. Green on matt screen with sound facility.
(RGB Lead **£6.50;** BNC Lead **£3.50**)
Carr. 14" & 20" **£8;** 12" **£6**

EPROM PROGRAMMER

A fully self-contained Eprom Programmer with its own power supply, able to program 2516, 2716, 2732, 2732A, 2764 and 27128 EPROMS.
Personality selection is simplified by use of a single rotary switch. Warning indicator for when programming is in operation.
In addition to operating as other standard programmers, it can also read, blank check, program and verify at any location on the EPROM to enable commercially available programmed EPROMs to be customised.
Simple menu driven software supplied on cassette (transferable to disc or EPROM if you prefer) is fully compatible with all versions of operating systems and BASIC.
EPROM Programmer complete with operating software and instructions **£79 + £2 p&p.**

PRODUCTION EPROM PROGRAMMER Type P800

It will blank check, copy and verify up to 8 Eproms at a time. Eprom types 2716 to 27128 can be selected by a single rotary switch.
£695 + £6 carriage.

EPROMS

2764-25	**£4.50**
27128-25	**£22.00**

FULL RANGE OF EPROMS IN STOCK

EPROM ERASERS

UV 1T Eprom Eraser:
Can handle up to 6 Eproms at a time. Average erasing time 20 mins. Built-in timer and mains indicator. Built-in safty interlock ensures no accidental exposure to harmful UV rays. **£59 + £2 p&p.**

LIGHT PEN

(RH-1). A superior design, with a 'push tip', status indicator LED, and an interface box that plugs into the user port. Comes with manual, full software and four Basic demonstration programs **£39.50p.**

BBC SYSTEM PACKAGE

SPECIAL OFFER

This package comprises of a BBC Model B computer fitted with disc interface and W.P. ROM 800K dual drive, NEC PC 8023 Printer and 12" Green Screen Monitor. The system is supplied complete with all manuals, connecting leads and software for stock control, invoice and statements and mailing lists.
Package Price £1,500 a saving of £139.

SIDEWAYS ROM EXPANSION BOARD

This board provides 8 high quality 28 pin sockets for expanding the computer's sideways ROM capacity by a further 128K. (Due to the power consumption of ROMS being approx. 40ma., in our opinion, we feel that a maximum of 8 ROMS would not normally overload the BBC Power Supply.) The board simply plugs into one of the four ROM sockets.
Absolutely no soldering or modification to the computer PCB is needed. Full fitting instructions supplied. All ROM sockets are with 'turned-pin' gold contacts, to ensure that considerable insertions and extractions will not wear out, or deform them.
The board is fully buffered and dimensioned, ensuring non-interference with on-board components.
Fully built and tested board **£25 + £2 p&p.**

BBC BOOKS (No VAT on books p&p £1.00/Bk)

ASSEMBLY LANGUAGE PROGRAMMING FOR THE BBC – BIRNBAUM	£8.95
BBC FORTH	£7.50
BBC LISP	£7.50
BPCL MANUAL	£15.00
30 HOUR BASIC	£5.50
BASIC PROGRAMMING ON THE BBC – CRYER	£5.95
35 EDUCATIONAL PROGRAMS FOR THE BBC MICRO – MURRY	£6.95
DISCOVERING BBC MICRO MACHINE CODE – STEPHENSON	£6.95
INTRODUCTION THE BBC MICRO – SINCLAIR	£5.95
EASY PROGRAMMING FOR THE BBC MICRO – BEESON	£5.95
FURTHER PROGRAMMING FOR THE BBC MICRO – THOMAS	£5.95
BBC MICRO INSTANT MACHINE CODE (BOOK & TAPE) – RUSHTON	£20.00
21 GAMES FOR THE BBC MICRO	£5.95
GAMES BBC COMPUTERS PLAY	£6.95
6502 ASSEMBLY LANGUAGE PROGRAMMING (LEVENTMAL)	£12.10
PROGRAMMING THE 6502 (ZAXS)	£10.95
STRUCTURED BASIC ON BBC	£7.95
SOUND & GRAPHICS ON BBC	£7.95

Please send SAE for our detailed price list of electronic and computer components.
We carry a wide range of connectors and assemblies, Microprocessors, RAMs, EPROMs, Crystals, etc.
Price Lists, Leaflets available on request. Large stocks enable same day despatch on most orders. Please check for delivery details.

PLEASE ADD 50p p&p & 15% VAT
(Export: no VAT, p&p at Cost)
Orders from Government Depts. & Colleges etc. welcome.
BARCLAYCARD VISA
Detailed Price List on request.
Stock items are normally by return of post.
Access

TECHNOMATIC LTD

MAIL ORDERS TO: 17 BURNLEY ROAD, LONDON NW10 1ED
SHOPS AT: 17 BURNLEY ROAD, LONDON NW10
(Tel: 01-452 1500, 01-450 6597. Telex: 922800)
305 EDGWARE ROAD, LONDON W2

A colour graphics terminal for a mainframe computer can cost hundreds or even thousands of pounds.

But the BBC Micro has the ability to communicate with a mainframe computer – and it has colour graphics facilities.

So if you already have a BBC machine you have the potential for making yourself a colour graphics terminal for the cost of an RS432 connector!

This is the saga of how two people attempted to connect a BBC Micro to a powerful Harris mainframe computer at Norwich City College. Most of the groundwork was done by Nick Frankland as a project for his HND computer science course, while Paul Beverley acted as tutor.

Describing the different stages they went through in order to get a final working system may enable other people who want to do a similar thing with a different mainframe computer to spot the likely pitfalls and see how they may be avoided with their own mainframe.

mainframe

Adapting the BBC Micro as a colour graphics terminal

THE THEORY of communicating between the BBC Micro and a mainframe computer is simple enough. The BBC machine has an interface known as the RS423, which is a serial interface through which the BBC can send and receive bytes of data.

The data is sent and received serially – that is to say, one bit at a time – in sets of eight bits to make up a byte, with one or two extra bits at each end for synchronisation purposes.

The 8 bit bytes of data can be regarded as either Ascii codes or as actual numerical data depending on how the receiving end interprets the information.

In all the following comments I shall be referring to the 1.2 operating system since in the 0.1 OS there are none of the software facilities available for using this serial interface.

When two computers are communicating with each other there may be different media carrying the information. Within one room, or at least one building, it is fairly easy to use cables which allow you to communicate at the fastest rate normally used. This is 9600 baud, which means 9600 bits per second.

Taking into account the synchronisation bits, this represents a speed of about 900 characters each second.

At greater distances you would need to use the public telephone system, unless you could afford to get British Telecom to install special cables for you. So you would have to work at a much slower speed – perhaps 300 or 1200 baud – because of the noise inherent in the system.

This is no problem for the BBC Micro. A single command in Basic or machine code can change the speed to any one of six between 9600 and 75 baud. What is more, you can set a different speed for sending than for receiving.

When different devices are communicating with the processor on the BBC Micro not only would there be different speeds of communication, but also there would tend to be different processing speeds.

Because of this, Acorn have provided the BBC Micro with buffers. These are areas of memory in which either information can be stored as it comes in before being processed, or in the reverse direction, where the processor can store information ready to be sent out to the serial interface.

There are buffers on the RS423 input and output and there is also a buffer on the keyboard so that characters can be stored up as they are typed in.

The idea is that as soon as somebody presses a key this interrupts the processor, which responds by scanning the keyboard to find out which key has been pressed.

It then puts the Ascii code of the character into the keyboard buffer ready to be processed when the processor has finished its current job.

If the RS423 is enabled as output, then every time the user asks for the processor to print a character or a string of characters they are not only sent to the screen but also are placed into the RS423 output buffer.

The RS423 interface then sends them out a byte at a time down the RS423 line at the appropriate speed. This is done by the 6850 ACIA (Asynchronous Communications Interface Adaptor) under the control of the serial ULA.

The ULA is a chip Acorn designed to control all the serial interfaces, including the cassette interface and the serial ROM interface.

After each byte has been sent out,

Making the connection

By PAUL BEVERLY

the ACIA interrupts the processor. This then responds by taking another byte from the output buffer and putting it into the ACIA, which sends it out serially along the RS423.

As far as the RS423 input is concerned, every time the ACIA receives a character it interrupts the processor. This takes the character from the ACIA and puts it into the RS423 input buffer.

Then, if the RS423 is enabled as input, these characters are taken by the processor and processed as and when it is ready to do so.

The first stage in the saga of connecting up to the mainframe computer is represented by the program in Figure I, where the BBC is set up as a dumb terminal.

What the program does is to look alternately at the RS423 input buffer and the keyboard input buffer. If it finds a character in the RS423 input buffer it writes it to the screen using the OSWRCH routine.

```
 10 REM Dumb Terminal Program
 20 REM P.E.Beverley  6/8/82
 30 REM Only works on O.S. 1.0 / 1.2
 40 REM Works even if Tube fitted.
 50 OSASCI=&FFE3
 60 OSBYTE=&FFF4
 70 OSWRCH=&FFEE
 80 CLS
110 DIM CODE 50
120 FOR J=0 TO 2 STEP2
130   P%=CODE
140   [OPT J
150   .RS423
160   LDA #&91
170   LDX #1
180   JSR OSBYTE \ character in RS423 buffer?
190   BCS keyboard
200   TYA
220   JSR OSWRCH \ or OSASCI for CR_LF
230   .keyboard
240   LDA #&91
250   LDX #0
260   JSR OSBYTE \ character in keyboard buffer?
270   BCS RS423
280   TYA
300   LDA #&8A
310   LDX #2
320   JSR OSBYTE \ Put it in RS423 output buffer
330   JMP RS423
340   ]
350   NEXT
360 *FX 7,7
370 *FX 8,7
380 *FX 2,2
390 CLS
400 CALL CODE
```

Figure I: Dumb terminal program

If on the other hand it finds a character in the keyboard input buffer, it takes it out and puts it in the RS423 output buffer so that it is sent off to the mainframe computer.

This program works well if all you want to do is send Ascii characters to and from the mainframe computer.

However, what we were interested in doing was to send codes which would enable the BBC to draw pictures and diagrams under instructions from the Harris computer.

The software on the BBC Micro has been arranged to make it easy to execute the various graphics commands. All you have to do is to send a series of bytes to the operating system in exactly the same way as you would if you were writing characters onto the screen.

If you look at the VDU code summary on page 507 of the User Guide you will see that each of the Ascii codes between 0 and 31 has a particular significance.

If any of these codes is sent to the operating system then the appropriate number of bytes following it are interpreted as the data for that particular command.

Look, for example, at Ascii code .19 which is used for controlling the colour palette, deciding which actual colour is displayed on the screen for each logical colour number.

If this is used in Basic you might say something like VDU 19,0,4,0,0,0. The effect would be to assign to logical colour 0, the actual colour 4, which is blue.

When you use that statement in Basic what actually happens is that the numbers 19,0,4,0,0,0 are sent in turn to the VDU drivers using the OSWRCH routine. The equivalent of this single command is shown as a machine code program in Figure II.

```
 10 MODE6                110 JSR OSWRCH
 20 DIM CODE 100         120 LDA #0
 30 OSWRCH = &FFEE       130 JSR OSWRCH
 40 P%=CODE              140 LDA #0
 50 [                    150 JSR OSWRCH
 60 LDA #19              160 LDA #0
 70 JSR OSWRCH           170 JSR OSWRCH
 80 LDA #0               180 RTS
 90 JSR OSWRCH           190 ]
100 LDA #4               200 CALL CODE
```

Figure II: Machine code version of VDU19 command

All of the graphics commands which the BBC uses – known in Basic as COLOUR, GCOL, PLOT, DRAW and MOVE – are available as VDU commands.

For example, DRAW 1000, 1000 could be translated into a VDU command as VDU 25,5,232,3,232,3.

The 25 signifies that this is a PLOT command, the number 5 following it specifies that it is to DRAW to the absolute position. The next four num-

→

From Page 41

bers represent the co-ordinates to which it is to draw.

In each case it is the low byte first followed by the high byte, so that 1000 is represented by 232,3 (1000 = 232 + 3 * 256).

So since all the graphics commands can be done by sending single bytes of information to the VDU drivers through OSWRCH it should in theory be an easy job to get the mainframe computer to send those same characters down to the BBC Micro to instruct it to do the drawing, etc.

We tried this and soon met up with our first problem – it didn't work. Or at least it worked at first and then after doing one or two PLOTS or DRAWS it suddenly shot off at some strange angle and then produced seemingly random graphics and text.

When we used a machine code monitor to have a look at the bytes in the RS423 buffer we discovered that it occasionally seemed to be missing one or two bytes.

Of course as soon as the bytes get out of step it interprets the bytes which follow as being the data for the position to which it should DRAW, and this is often way off the screen.

So the question is: "Why does the system miss out certain characters?" Is it that the BBC Micro is not receiving the characters correctly and putting them into the buffer? Or is the Harris mainframe computer not sending them properly?

To cut a long story short, the answer is that it is both.

It took a long time to work out what was causing the difficulty, simply because there were actually three entirely separate reasons for the characters being missed out.

These were:

- *PROBLEM ONE:* The BBC Micro does not like receiving ESCAPE characters – character &1B (=27). If one of these is sent down, the operating system interprets it as an ESCAPE and does not put the number into the buffer.

Thus it gets very confused if it receives something like DRAW 27,27 (= VDU 25,5,27,0,27,0).

- *PROBLEM TWO:* As the Harris is preparing to send bytes down to the BBC it stores them up in a buffer, which is normally 80 characters long. Then when the buffer is full, or when a carriage return is sent, it passes them down to the BBC machine.

It then sends three bytes – 0D, 00 and 0A – which would normally be used to produce a carriage return and line feed in the receiving terminal. But these of course are interpreted by the BBC as data.

- *PROBLEM THREE:* Zero, as a code, is what is known as a "null" – that is, "do not do anything". So if you have a command which ends with one or more zeros, then before the Harris sends it, it strips the zeros off, knowing that no terminal is interested in nulls!

If, for example, you want to DRAW 100, 100 you would send 25, 5, 100, 0, 100, 0.

Now since the last byte is a null, it is stripped off and the next byte which follows it is interpreted as the high byte

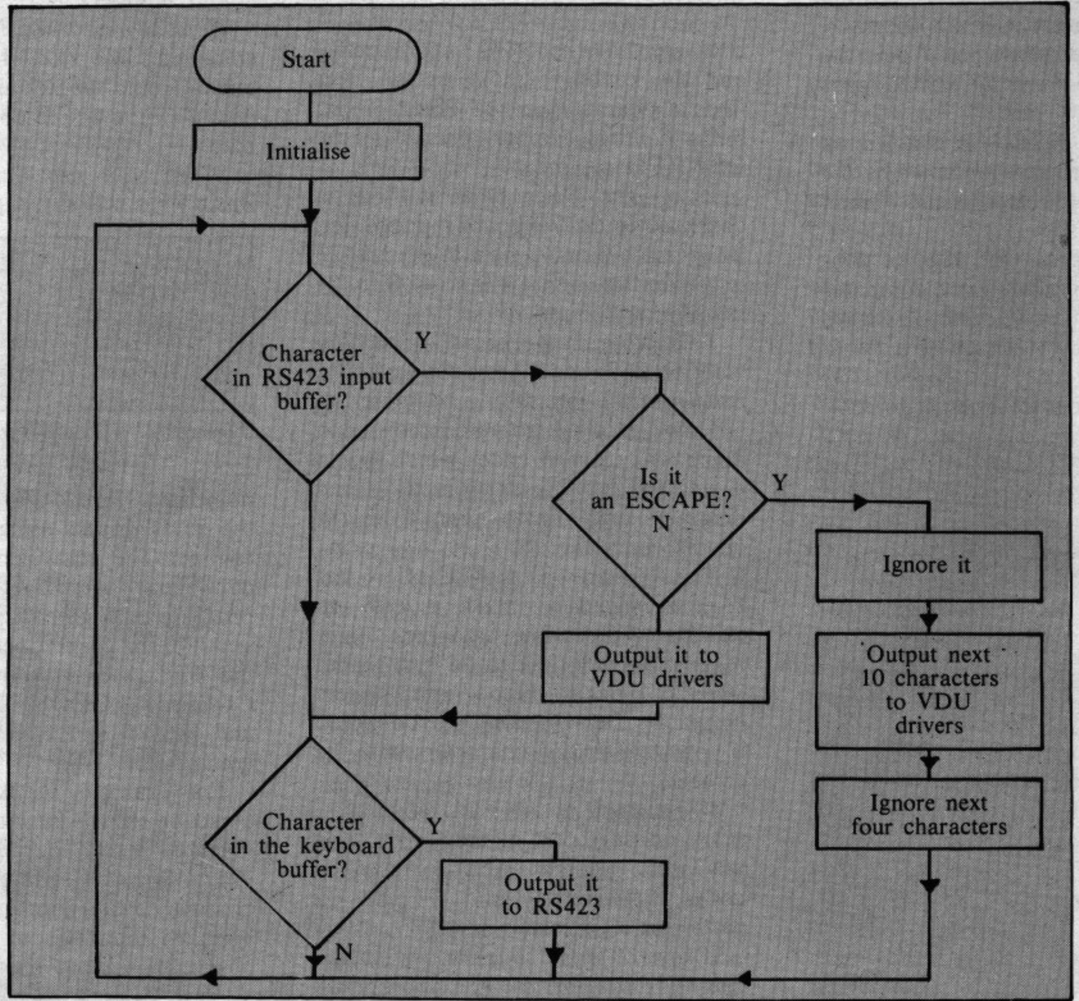

Start
Initialise
Character in RS423 input buffer?
Y
Is it an ESCAPE?
Y
N
Ignore it
Output next 10 characters to VDU drivers
Ignore next four characters
Output it to VDU drivers
Character in the keyboard buffer?
Y
N
Output it to RS423

Figure III: Flow diagram of graphics terminal program

of the Y coordinate of the DRAW command.

So if it happens to be a carriage return (&0D=13), the operating system draws to 100, 3428! (3428 = 100 + 13 * 256).

The solution to the first problem is simple. As part of the initialisation of the BBC Micro, you simply say *FX229,1, or the equivalent in machine code. It then ignores ESCAPE codes and treats them as ordinary characters or as data. To re-enable ESCAPE after using the terminal program use *FX229,0.

After various unsuccessful attempts, the second two problems have finally been solved by one expedient. This is to frame every graphics command in a block of known length starting with an ESCAPE character and ending with a carriage return, which ensures that the Harris sends it straight away without first storing it in a buffer.

The size of the block has to be big enough for the longest command, and therefore the shorter commands have to be padded out with nulls.

These nulls are not stripped off by the Harris because of the carriage return at the end of the block, but at the BBC end the nulls are not acted on anyway.

However, we do not want the carriage return to be acted on either, so this has to be stripped off by the terminal software in the BBC machine itself.

In fact, to get the Harris to send the graphics command we had to get it to PRINT "." – that is, to print a dummy character with a carriage return.

This produces four bytes – 2E 0D 00 0A – which are then ignored by the terminal software.

The software at the BBC end is shown in the form of a flow diagram in Figure III and as an actual listing in Figure IV.

It looks at each character as it comes in and, unless it is an ESCAPE character, sends it to the VDU drivers so that it will be printed out to the screen.

If it is an ESCAPE code the software ignores it, but uses counters in order to take in the next 10 characters and send them to the VDU drivers. Then it ignores the next four characters.

The format of the graphics command block is shown in Figure V.

```
 10 *KEY0VDU19;4;0;|M
 20 *KEY1RUN|M
 30 *KEY2CLS|M
 40 *KEY3*TAPE|M
 50 *KEY4LO.""|M
 60 *KEY5CH.""|M
 70 *KEY6*TV0|M
 80 *KEY7OLD|M*TAPE|MMODE1|M
 90 *KEY8OLD|M*TAPE|MMODE0|M
100 *KEY9CALL&C00|M
110 *FX12,5
120 *FX11,25
130 *FX229,1
140 REM Set TAB key for BACKSPACE
150 *FX219,8
160 MODE0
170 VDU19;4;0;
180 OSBYTE=&FFF4
190 OSWRCH=&FFEE
200 FOR J=0 TO 2 STEP 2
210   P%=&C00
220   [OPT J
230   LDA#2
240   LDX#2          \ RS423 & keyboard
250   JSR OSBYTE     \ enabled as input
260   .RS423G
270   JSR RSINP      \ Anything in RS423?
280   BCS keyboard \ If not look at keyboard
290   CPY #27        \ Graphics block coming ?
300   BNE print
310   .GTERM         \ Graphics routine
320   LDA #10
330   STA &87
340   .INP1
350   JSR RSINP
360   BCS INP1
370   TYA
380   JSR OSWRCH     \ Send to VDU drivers
390   DEC &87
400   BNE INP1
410   LDA #4         \ Ignore ".", CR, null & LF.
420   STA &87
430   .INP2
440   JSR RSINP
450   BCS INP2
460   DEC &87
470   BNE INP2
480   .RS423T        \ Normal text routine
490   JSR RSINP
500   BCS keyboard
510   CPY #27
520   BEQ GTERM
530   .print         \ Write character to screen
540   TYA
550   JSR OSWRCH
560   .keyboard
570   LDA #&91
580   LDX #0
590   JSR OSBYTE     \ Character in keyb'd buffer?
600   BCS RS423T
610   LDA #&8A
620   LDX #2
630   JSR OSBYTE     \ Send to RS423 output buffer
640   JMP RS423T
650   .RSINP
660   LDA #&91
670   LDX #1         \ Get character from
680   JSR OSBYTE     \ RS423 input buffer.
690   RTS
700   ]
710   NEXT
720 *FX7,7
730 *FX8,7
740 CLS
750 PRINT'"Ready at 9600 baud."
760 PRINT'"Press f9 for terminal mode."
770 PRINT'"Use TAB key for BACKSPACE."
```

Figure IV: Graphics terminal program

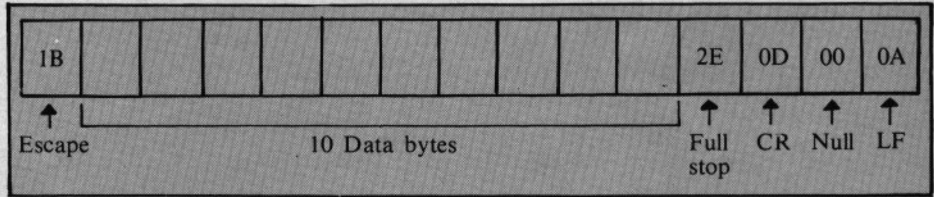


Figure V: Format of the graphics command block

If, as is the case with our Harris mainframe computer, you have no hand-shaking lines available for the terminals, you may have problems if you write a program on the mainframe which sends down a lot of graphics commands in quick succession.

This is because the buffers on the RS423 input become full and there is no mechanism for stopping the flow of characters trying to fill up this buffer.

One solution would be to implement what is called "software handshaking". This means that when the buffer becomes full it generates an event within the micro which sends out an XOFF control code to stop the mainframe sending any more characters.

When the buffer is nearly empty you can then send an XON control code to start the communication from the Harris again.

The other method is simply to have some means of slowing down the program, such as by putting SLEEP commands into the program. This is only likely to be necessary if you are working at the full 9600 baud.

Nothing has been said so far about the software on the mainframe computer which is generating all these graphics commands.

In our case because of the limited development time available we decided to use Basic to generate all the codes. Later we would be able to assemble these routines so that they could be provided as machine code subroutines which could be called from other languages on the Harris.

There is a lot of work still to be done on this, and in any case it is peculiar to the mainframe computer you are using. So no more need be said about it here.

In conclusion, I hope that you will see the potential which we have tried to set out in this article.

The BBC Micro CAN be used as a colour graphics terminal to a mainframe or a minicomputer although there are likely to be problems when you try to implement it. Hopefully we have shown some of the likely ones and the possible solutions.

If you have any particular queries or ideas to share regarding this link-up with the BBC Micro, please feel free to contact me at Norwich City College.

The address is Paul Beverley, Department of Electronics, Norwich City College, Ipswich Road, Norwich, NR2 2LJ.

● NEXT MONTH: Paul Beverley writes about how to link two BBC Micros using the RS423 port.

Launch your BBC micro with the Torch Z80 disc pack.

If you already have a BBC Model B micro, then you know that it is not a toy. But neither is it suitable for business or for serious programming because it lacks the access speeds and massive storage capacity that only floppy discs can provide.

The answer is a TORCH Z80 DISC PACK. The twin discs store up to 800K of data and programs, while the Z80 processor board provides an extra 63K of user memory and Torch's CP/M* compatible operating system – giving access to the largest range of software currently available.

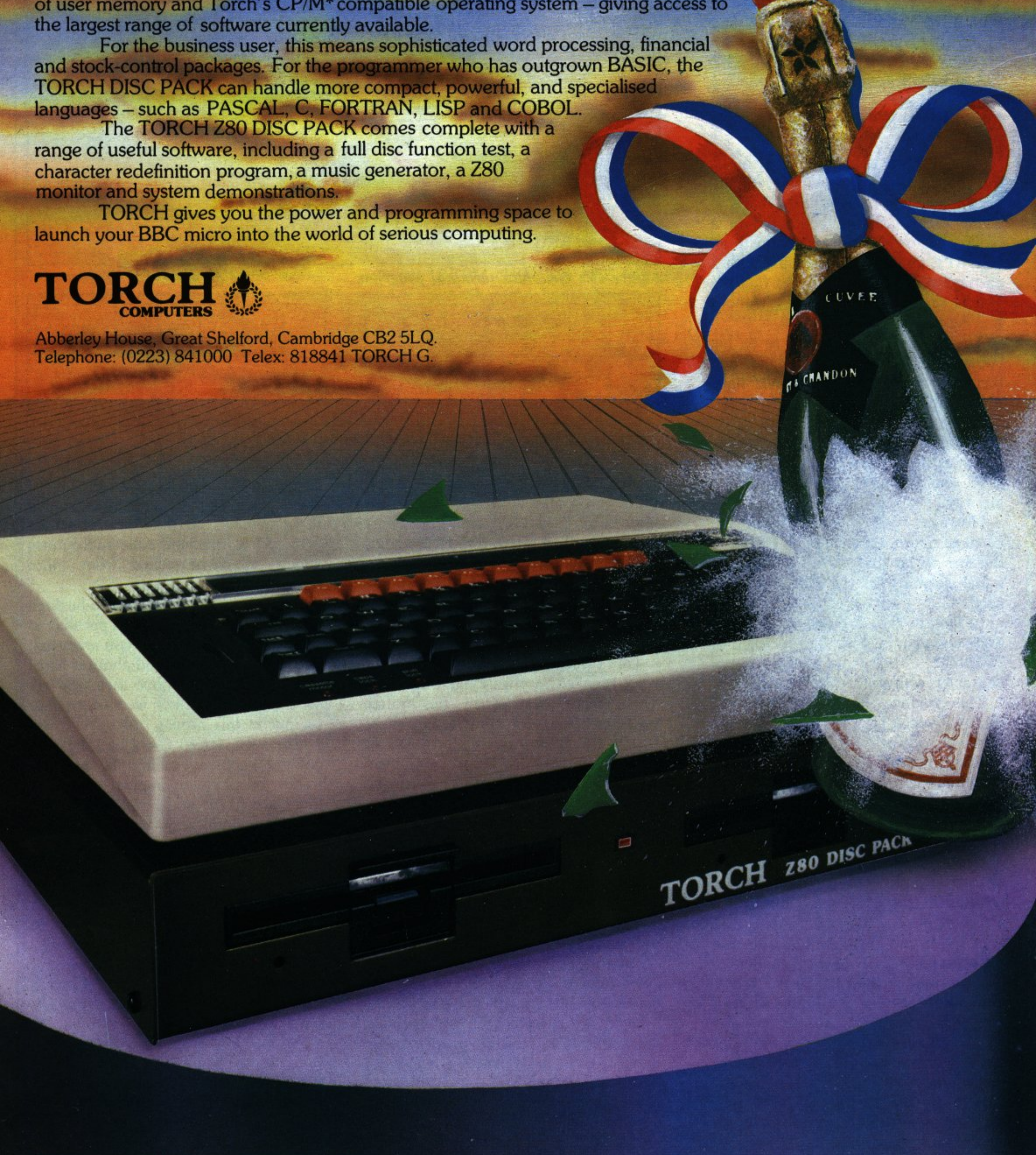
For the business user, this means sophisticated word processing, financial and stock-control packages. For the programmer who has outgrown BASIC, the TORCH DISC PACK can handle more compact, powerful, and specialised languages – such as PASCAL, C, FORTRAN, LISP and COBOL.

The TORCH Z80 DISC PACK comes complete with a range of useful software, including a full disc function test, a character redefinition program, a music generator, a Z80 monitor and system demonstrations.

TORCH gives you the power and programming space to launch your BBC micro into the world of serious computing.

TORCH
COMPUTERS

Abberley House, Great Shelford, Cambridge CB2 5LQ.
Telephone: (0223) 841000 Telex: 818841 TORCH G.



---

*CP/M is the registered trademark of Digital Research Ltd.

This month's contest

Will Space Invaders ever catch on?

write enable
A
B

Actual size

Your answer could win you this unique Hobbit floppy disc system

STEP back several years in time. A sensational new game has appeared in the pubs and amusement arcades.

It captivates, excites and frustrates everyone who plays it.

It's called Space Invaders.

Suppose you were one of the very first people to play this new game. How would you describe it to someone who had never heard of it before?

That is what we want you to do for this month's competition.

In not more than 100 words, write a description of Space Invaders and say how you rate it as a game.

Then send it in, on the coupon below, before August 31.

- ★ **Seven times faster than a cassette recorder**
- ★ **Access time averages 22 seconds**
- ★ **Compatible with all versions of the BBC OS**
- ★ **Five files can be opened simultaneously**
- ★ **Reads and writes at 750 bytes a second**

ENTER NOW

Name ....

Address ....

....

....

....

Tel No. ....

POST TO: Hobbit Contest, Micro User,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

This is how I would review Space Invaders:

....*Continue on separate sheet if necessary*

SOFTWARE FOR YOUR MICRO

British Broadcasting Corporation

BRITISH BROADCASTING CORPORATION
BBC SOFT
EARLY LEARNING
5 maths and spelling programs for children
GAMES of STRATEGY
GALAXY • GOMOKU • MASTERBRAIN • REVERSI
FUN GAMES
BREAKOUT • DODGEMS • FLASH • SNAKE
home finance
PAINTING
DRAWING
The Computer Programme
Programs 1
The Computer Programme
Programs 2
MUSIC
ACORNSOFT

These high-quality software packs have been specially developed to make the most of the sophisticated design and great versatility of the British Broadcasting Corporation Microcomputer.

They enable you to use your computer for a huge range of activities – from education to music, drawing, personal finance or games of skill and strategy.

Each pack contains a comprehensive handbook and a pre-recorded cassette carrying a set of programs. They will operate on Model A or Model B except for *The Computer Programme Programs Vol. 2*, which is for Model B only.

Early Learning

A colourful and stimulating learning aid designed to help young children develop their word and number skills.

Fun Games

Four great games with colour and sound to test your speed, skill and co-ordination.

Games of Strategy

Test your brain-power and tactical skills against the computer's with these intriguing games.

Home Finance

Commissioned from the Consumers' Association, these programs will help you make the right decisions about money.

Painting

Use the computer as a palette to produce full-colour designs and wonderful 3-D effects.

Drawing

Exploit your computer's graphics capabilities to create an infinite variety of shapes and patterns.

Music

The computer becomes a simple musical instrument, enabling you to compose, play and listen to your own tunes.

The Computer Programme Programs Vol. 1

Twelve of the most popular programs demonstrated in the BBC television series.

The Computer Programme Programs Vol. 2

These more sophisticated programs make use of the additional memory capacity of the Model B computer.

ON SALE NOW AT
SELECTED BOOKSELLERS AND
MICROCOMPUTER SHOPS **£10 each**

See us on Stand 18 at the Acorn User Exhibition, Cunard Hotel, Hammersmith (25–28 August) or on Stand 138 Hall A Lower. Personal Computer World Show, Barbican Centre, City of London (28 September–2 October)

ARE YOU SERIOUS?

REPLICA is the fastest selling disc utility for the BBC Micro and THE KEY is a close second—BUT WHY?

REPLICA and THE KEY give you, the user, what you want. You have bought your disc drives and now want to take advantage of them, but most of your favourite software will not run with the disc interface and even if you are prepared to pay out for disc versions of everything you can't get them and if you have 80 track drives you might as well give up. If you know everything about the DFS, memory locations, saving procedures etc, you can probably save some of them onto disc. What's a half hour per program, and it only takes a few minutes to find, load and relocate it each time (if you can remember the sequence).
On the other hand you could buy REPLICA, enter a few details i.e. 1) program name, 2) number of sections, 3) CHAIN, *RUN or *LOAD 4) press play and then make a cup of tea whilst the program loads from cassette for the last time. When you return the program will be on the disc and shown in a menu under the name you gave it. There are now eight alternative storage methods and one of them will work with most programs. There are some exceptions but the outstanding sales figures for REPLICA indicate that they are not relevant. Many users have purchased 4 or 5 copies of REPLICA and it is now the recognised format that dealers use to display their software.

REPLICA will hold 8/10 programs on each disc, they can be erased if required and a new batch saved, but why not just buy another REPLICA and keep your programs on disc permanently (it costs about £1 per program).

REPLICA **£9.95** (state 40 or 80 track)

Replica is compatible with the PACE DFS.

THE KEY

THE KEY provides you with the facilities that should have been included in the Disc Filing System and also helps you reach the parts other discs can't reach. This new version of THE KEY has been made compatible with ECONET at the request of many schools, colleges and universities. The whole program has been turbocharged and the facilities are:

1) FORM40 – now much faster.
2) FORM80 – now much faster.
3) BACKUP – has that effect on some people because it allows even most of the protected discs to be backed up – faster too.
4) EDITOR – display, read and alter sectors, even if you can't list the program. Highlight any byte whilst searching, make additional searches, edit bytes – now allows entry in HEX or ASCII and in string format. Dump a sector to printer, file pointers etc etc. You can now see how data is stored on a disc and alter it if you wish. Of course, it's also faster.
5) RETRIEVE – don't despair when you have a corrupted disc or if a program is accidentally deleted, using RETRIEVE your worries are over.

With so much from one utility it is no wonder that THE KEY is outselling programs that cost the same but provide far less.

THE KEY **£12.95** (state 40 or 80 track)

THE KEY is compatible with the PACE DFS.

GRAFKEY/GRAFDISK

The first and best CAD program for the BBC Micro. Used in education, business, art, video etc. Recommended by LASERBUG, BBC MICRO USER, PCW, SOFT and thousands of satisfied users (see earlier issues of BBC Micro User for screen pictures). In a comparative review of the major CAD programs PCW said: "Considering the options it is by far the best value". Need we say more, if you need a graphics utility then this is it.

GRAFKEY (joystick & keyboard) **£7.95**
GRAFDISK (state 40 or 80 track) **£12.95**

BEEBSYNTH (requires 1.0 + O.S.)

Design and save up to 16 envelopes very easily. The keyboard section allows you to use your own envelopes or the inbuilt ones to turn the keyboard into a musical instrument, but you decide what instrument. BEEBSYNTH is the only commercial program that doesn't require a knowledge of music and the envelope command, but if you do have the knowledge then BEEBSYNTH is a very powerful and flexible tool. (HCW says: "Having played with it for hours, I can safely say I think it's two programs for the price of one".)

CASSETTE **£7.95**
DISC **£10.95**

JOYSTICK UTILITY

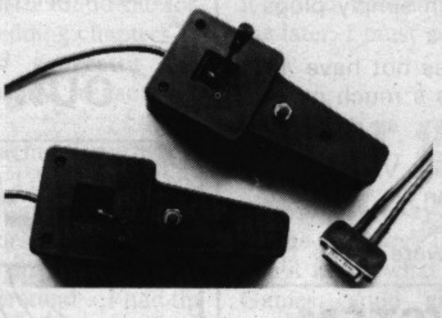
Converts non-joystick programs to work with joysticks. Works with any program using INKEY(-), which applies to most programs. Easy to use, just press the keys you want to transfer. Supplied on cassette but can be transferred to disc.

CASSETTE **£5.00**

JOYSTICKS

Pair of fully proportional joysticks of compact and handy size

£17.95



EDUCATIONAL CORNER

(for the 5-11 age group)

THE GARDEN – 3 programs with superb graphics. Covers: colours, spelling and understanding. Cassette £6.95

COUNTING – robots, rockets, flowers, etc. Excellent graphics, good range. Cassette £4.95

MATCHING – 4 programs covering numbers, words, shapes and patterns. Cassette £5.95

COLOUR MATCHING – A superb teaching-aid, using animation techniques in Mode 7. A hit with adults and children alike. Cassette £4.95

And now **SHAPE MATCHING** using the same techniques. This is the second in an integrated approach to teaching. £5.00

INTRO – A simple programming language which uses the immediate visual response of "Turtle" graphics to introduce a number of programming concepts and techniques. Cassette (and 9 page manual) £7.95

PROGRAMMERS

We are constantly seeking new and interesting programs. Why not send yours for appraisal? Do not worry if the presentation is not to professional standards – we are looking for new ideas and we will advise and assist in bringing your program to the required standard. You have got nothing to lose but much to gain – So why not send your program today? 40 Track disc if possible or two copies on cassette. In some cases we will even provide disc drives against future royalties.

CLARES MICRO SUPPLIES

Dept. BMU9, Providence House,
222 Townfield Road, Winsford,
Cheshire CW7 4AX.
Tel: 06065 51374

All prices inclusive of VAT + Carriage – No Extras.

BBC MICRO IN MANCHESTER

All prices include VAT unless otherwise stated

BBC Model B Computer	£399
BBC Model B with Disc Interface	£469
BBC Model B with Disc Interface and VIEW	£528.90
BBC Model A Computer	£299
A to B Upgrade (including fitting)	£69
Disc Upgrade (including fitting)	£95
VIEW Word Processor	£59.90

BBC COMPUTER HARDWARE
always in stock

TEAC SLIMLINE DISC DRIVES

Including Cables, Formatting Disc, Disc Manual and 12 months guarantee. We have provided over 100 of this type of drive to personal users, educational establishments and companies, and there are probably around 1,000 BBC users of this extremely reliable disc drive.
It can also be twinned at a later date to give 200K.

100K – **£205** inc. VAT 400K – **£345** inc. VAT
Twin 100K's to give 200K **£389** inc. VAT

BBC COMPUTER DISC DRIVES
always in stock

★ ★ MASSIVE RANGE OF GAMES ALWAYS IN STOCK ★ ★

16K RAM CARD

If you're running out of RAM our new 16K CARD gives you a total of 48K. Compatible with cassette or disc filing system.
Supplied with demo software.
£79.95

AP100A Acorn Printer

- Centronics interface
- Several character sets
- Screen Dumps (free screen dump prog.)
- Double size
- Our best-selling printer

£219 inc. VAT

STAR DP510

- Centronics interface
- Top quality Dot Matrix
- Many character sets
- Screen Dumps
- Italics/Double Size
- Form and tractor feed
- True descenders

£289 inc. VAT

CHIPCHAT

Speech synthesizer for your BBC. This is a completely Acorn hardware and software compatible speech synthesizer which simply plugs inside your micro.
Although the Acorn synthesizer does not have as many words or phrases, Chipchat is a much more affordable system.
Price – ONLY **£39.95** inc. VAT
Ring for a demonstration
Available now.
Supplied with demo software

DISC UPGRADE

100K Teac Drive	£205
Disc Interface	£95
	~~£300~~

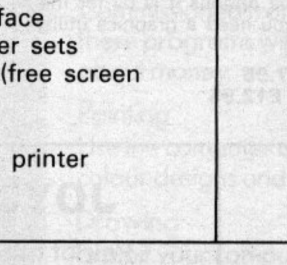
OUR PRICE £299 inc. VAT

PROFESSIONAL SYSTEM

100K Teac Drive	£205
Acorn AP100A	£219
	~~£424~~

OUR PRICE £419 inc. VAT

C ☆ TECH COMPUTERS



184 Market Street,
Hyde,
Cheshire SK14 1EX.
Tel: 061-366 8223

EDUCATIONAL & BULK DISCOUNTS AVAILABLE

Guide in hand, go fearlessly through the micro jungle

The BBC Micro – An Expert Guide
By Mike James (Granada)

UNTIL I got a copy of this book for review I'd never realised how much it was needed to fill a gap in the literature on BBC Micros (and gaps in my knowledge).

It is a book aimed at those who already know how to use the machine but would like to know a little more about how it works, its operating system and the hardware it controls.

If that describes you then have no fear, for with this book in hand you can safely explore the territory that the beginner guides mark with "here lie strange beasts".

Having said that, it's not a simple book but then its subject matter isn't simple either. It assumes that you have a fairly good grasp of Basic and are on nodding terms with the User Guide.

Given this you'll find it a clear and well thought out exposition on some of the more complex but intriguing features of the BBC Micro.

The aim of the book is to cover both the hardware and software of the BBC Micro and show how they function as a whole. All of the chapters except one are self-contained descriptions of one aspect of the micro – as much as anything can be self contained in such an intricate and interrelated whole.

And this is the beauty of the book. You can use it to suit your own needs and depth of knowledge.

I'm more at home with programming so I started on the software-based chapters. I began with the easily grasped descriptions of BBC Basic and the machine operating system and moved on to the short but thorough introduction to assembly language.

After this I found the formerly forbidding chapters on the sound generator and video display reasonably easy.

Then armed with the knowledge I'd gained – and the occasional dip into the hardware orientated chapters to clear up something I didn't understand – I had the confidence to attempt the chapters on the machine hardware and interfacing.

One aspect I liked was the author's honesty. He admits we won't grasp everything at once.

He uses the analogy of a jig-saw puzzle. Bits will fall into place one by one, so if you don't understand something at first you might later in the light of something else you've read.

Also his chapter on interfacing ends by saying that you won't understand it fully until you've tried it in practice. And he warns you that assembly language IS difficult.

Because of this I felt comforted when I came to something that was beyond me and I could read on thinking it would probably come to me later. I must admit it was nice to be given a book for review that is so clearly written that when you don't follow something, you know that it's you at fault and not the author!

Mike James has produced a well written, useful book. I leave it to you to decide whether it's an expert guide or not, but it's certainly a sensible, well-explained handbook on some of the more intricate parts of the BBC Micro.

The man is an unashamed enthusiast and with this book he's done other, less knowledgeable enthusiasts a great service: he's produced a readable, reasonable guide to both the ghost and the machine. **PB**

For games fanatics

Games BBC Computers Play *by Hartnell, Gee, James (Interface)*

WHAT can I say? One look at the authors' names and you'll know what to expect. Games, good games, fun games, frustrating games.

There are some 40 listings covering all the games you might expect and also a few more unusual ones.

The programs have mostly been translated into BBC Basic from other dialects and they make good use of the Beeb's graphics and program structures. Each listing is well introduced, clear and easy to follow. If you're a games fanatic this book is well worth considering.

Filling in those Basic gaps...

Structured Programming With BBC Basic *by Roy Atherton (Ellis Harwood)*

IF you are dissatisfied with the way you write programs, if you feel that your command of Basic is haphazard with large gaps and if you want a simple but thorough guide to better programming style on the BBC Micro, then this is the book for you.

In his introduction Roy Atherton states his belief that good programming in BBC Basic is possible for everyone, even the beginner, and in ten thoughtful, thought-provoking chapters goes on to prove his point.

The aim of the book is not just to teach syntax and the rules of the grammar of Basic but also to encourage problem analysis and program design and structure. Each topic is introduced at a simple level and treated in greater depth as the book goes on.

With emphasis on logic, data structures and graphics the teachings of the book come together in the penultimate chapter, which uses what has been covered previously to show the construction of a logical game program.

With its copious examples and problems, each with a full solution, and its simple treatment of a complex subject, "Structured Programming With BBC Basic" will probably become the standard work on the subject.

Further Programming for the BBC Micro *by Alan Thomas (Shiva)*

IF you have already taken your first steps in Basic and want a little more depth and a lot more practice, then this is probably the book for you. It is a well presented, easy to follow guide to the stage just beyond beginning BBC Basic.

The subject is divided into easily-digested parts and is program based, which means you get a lot of simple, useful programs to illustrate the points raised. You also get hints and tips on how these can be improved or made more complex.

Simple and straightforward, this book is a worthy successor to "Easy Programming for the BBC Micro" in the same series.

The games 16-year-olds play...

Games For Your BBC Micro *by Alex Gollner (Virgin)*

NO doubt you have come across those precocious youths – you might be one yourself – who seem to have cut their teeth on a micro's keyboard. Well here is a book of games listings from one of them, a lad of 16. And very good value for money it is (other publishers please note).

For your money you get 20 games which vary from the bang-whizz favourites of the arcades to logic games like Knightsbridge. Also included is an interesting game which turns your microcomputer into a micro-psychiatrist.

Add to all this an article on programming and a comprehensive glossary and you've got quite an impressive little book.

GAMES WANTED

"Everyone has got at least one novel inside him, and every BBC Micro owner has at least one original game waiting to be programmed." – ***Zen in the Art of Computer Programming.***

So says our editor in his forthcoming book. Is he correct though? Have you got a games program locked away in your subconcious, just waiting to see the light of day?

If so, get in touch with us right away – we're only too willing to hear from you. And we've got our team of experts ready to help evaluate your work and add any necessary finishing touches.

Of course, if it's good enough, we shall want to include it in the pages of BBC Micro User. So send a copy of your original games program, on cassette or disc, to:

The Editor, Micro User, Europa House,
68 Chester Road, Hazel Grove, Stockport.

And please mark your envelope clearly "GAME".

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Space Hi/Way	Alien raiders swoop down to steal your fuel, variable strength laser blasts.		●			£8.45	£7.45	Amcom
Space Maze	Find your way through to the transmat before you are cornered and eaten.	●		●			£6.95	Program Power
Star Maze II	You are lost in an amazing 3D maze on a platform in space. (1 player).	●		●			£8.50	Kay Dee
Superlife	Fast (machine code) version of a popular Game of Life in a large universe.	●		●		£9.50	£8	Golem
Ten Little Indians	In a strange country mansion you discover a number of eerie idols.			●		£10.29	£10.29	Digital Fantasia
Time Machine	As a newspaper reporter you are sent to investigate the eccentric professor.			●		£10.29	£10.29	Digital Fantasia
Wall	Full colour, fast action version of Breakout with adjustable bat size.	●		●			£5.95	Micro Power
Wizard Akyrz	Mission is to save the distraught king's daughter from the evil wizard Akyrz.			●		£10.29	£10.29	Digital Fantasia
Alien Swirl	Shoot down the swirling invaders before they shoot you.	●		●			£6.95	Program Power

BUSINESS

Title	Description	Model A	Model B	Joystick	Keyboard	Disc	Cassette	Supplier
Merlin Scribe	A full disc based system word processor for professional use.	●		●	●	£59.95	£29.95	Merlin
Record Changer	Data base search and sort on any field. Powerful arithmetic facilities.	●		●		£24.95	£19.95	AJ Vision

Programs featured in this Guide are supplied by:

Micro Power Ltd, 8/8A Regent Street, Chapel Allerton, Leeds LS7 4PE. **A.J. Vision Service Ltd,** 61 Jeddo Road, London W12 9ED. **Golem Ltd,** 77 Qualitas, Bracknell, Berks RG12 4QG. **Musicsoft,** 12 Fallowfield, Ampthill, Beds. **Amcom,** 23 Hivings Hill, Chesham, Bucks HP5 2PG. **Ed. Soft,** 76 Woodville Road, Exmouth EX8 1SW. **Primasoft,** Freepost, Glossop, Derbys. **Carswell Computers,** Carswell Barn, Faringdon, Oxon SN7 8JN. **Digital Fantasia,** 24 Norbreck Road, Norbreck, Blackpool FY5 1RP. **Carsondale Enterprises Ltd.,** 44 Kingsway, Stoke-on-Trent Staffs ST4 1JH. **Garland Computing,** 35 Dean Hill, Plymouth PL9 9AF. **Schoolsoft,** 19 Shadwell Grove, Radcliffe-on-Trent, Nottingham NG12 2ET. **Cambridge University Press,** The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU. **Logic Systems,** 129 High Street, Cherry Hinton, Cambridge. **Chalksoft Ltd.,** 37 Willowslea Road, Worcester WR3 7QP. **IJK Software Ltd.,** 9 King Street, Blackpool, Lancs. **Kay Dee Software Ltd.,** 27 City Road, Fenton, Stoke-on-Trent. **Merlin Computer Products,** 18 Mansel Street, Swansea SA1 5SG.

Previous parts of the Guide to Software for the BBC Micro appeared in the June, July and August issues of ***The Micro User.*** **Copies cost £1.25 each and can be obtained by filling in the order form on Page 77 of this issue, or by writing to: The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.**

● *While every care has been taken in compiling details for this Guide, no responsibility can be accepted for any errors or omissions.*

Fold

Part 4

THE MICRO USER

Guide to Software for the BBC Micro

EDUCATION

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
Anagram	Most used nouns scrambled and displayed to aid early learning.	●	●	●			£4.95	Ed. Soft
Balance Your Diet	Analyse what you eat. This program displays energy intake and levels of components of food.	●		●			£13.95	C.U.P.
Chromosome Mapping	A simulation based on experiments to determine the sequence of genes on the chromosome.	●		●		£14	£12	Garland
Competitive Maths	Addition, subtraction, multiplication and Division. Various levels of difficulty.	●		●			£5.50	Schoolsoft
Coucapcur	Countries, capitals and currencies of 34 European countries are displayed for you to work out.	●	●	●			£4.95	Ed. Soft
Decimals	Self explanatory, graded practice.	●		●			£9.25	Chalksoft
Educational 1	Animated graphics will encourage children to enjoy maths, spelling and telling the time.	●		●		£9.50	£8	Golem
Educational 2	Similar to Educa 1 but more advanced.	●		●		£9.50	£8	Golem
Eiffel Tower	Build the E.T. as you learn sets of vocabulary.	●		●			£9.25	Chalksoft
Fields	A simulation of experiments in magnetism and electricity.	●		●		£14	£12	Garland

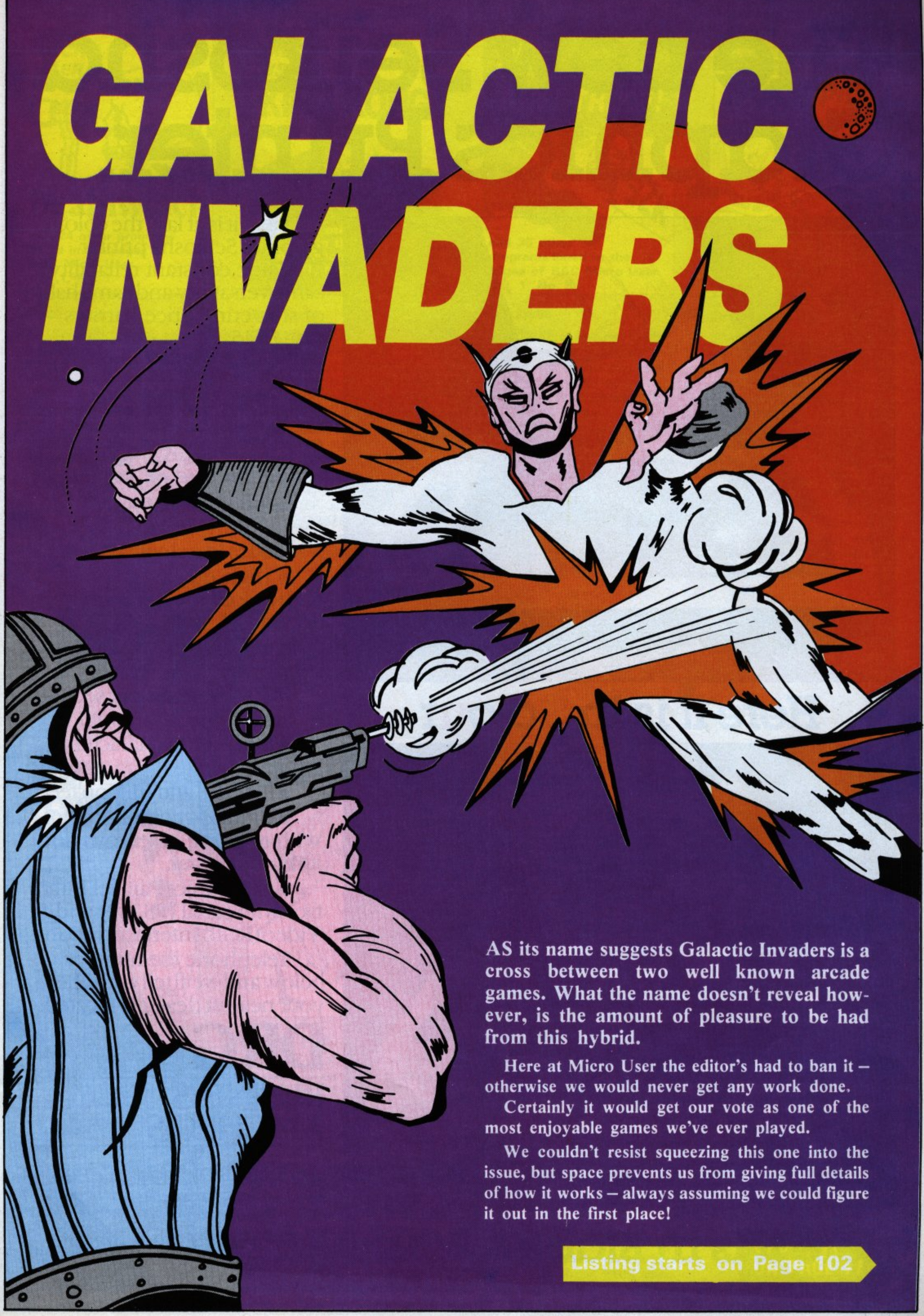
Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
French Irreg. Verbs	150 plus mainly irregular verbs in all non compound tenses.	●		●			£18.86	Carsondale
Fun with Words	The tape includes Alpha, Vowels, There, Suffixes and Hangman.	●		●		£9.50	£8	Golem
Keyrecog	A non competitive keyboard test program. Ideal for those unsure about clocks.			●			£4.95	Ed. Soft
MMaths	MMaths add, divide, subtract, multiplication.			●			£4.95	Ed. Soft
Moving Molecules	Explains Charles' Boyle's Law through simple kinetic theory.	●		●			£13.95	C.U.P.
Music Master	A music writer based on word processing. You type the notes and the computer plays the music.	●	●	●	●		£6.95	Merlin
Music Tutor	Program enables musical notation to be entered, notes displayed. Many options.	●		●		£12.95	£10.95	Garland
Options Table	Helps produce an options timetable for secondary schools.	●		●		£19.95	£14.95	AJ Vision
Peggit	A deductive aid for 5 to 50 year olds, 6 colours selected at random.	●	●	●			£54.95	Ed. Soft
Picture Maths	Maths practice program for primary schools. Uses graphics to maintain interest.	●		●		£12.95	£9.95	AJ Vision
Pieman	Five progressive music games. For aural training and fun.	●		●				Musicsoft
Population Growth	A program in 3 parts showing how population change results from an imbalance in births and deaths.	●		●			£13.95	C.U.P.
Puncman 3,4	Harder punctuation learned in fun way, follow up to Puncman 1,2.	●		●			£9.25	Chalksoft
Reversals	Two seagulls help with reversals of letters for remedial children and adults.	●		●			£9.25	Chalksoft
Sea Battle	A game which helps the user learn about angles and bearings.	●		●			£5.95	Garland
Simple Word Proc.	Easy to use, limited test storage. Ideal for beginners.	●		●		£14.95	£9.95	AJ Vision
StoryA	Spanish Gold – first multi choice story on screen and graphics.	●		●			£7.95	Chalksoft
Top of the Pops	Guide your group to the No. 1 spot/ simulation.	●		●			£9.25	Chalksoft
Wordflash 1/2	50% of juvenile speech words, flashed on the screen at regular intervals.	●	●	●			£4.95	Ed. Soft
German Irreg. Verbs	Thousands of verbs forms in all tenses. Browse and test facilities.	●		●			£13.80	Carsondale
Russian Irreg. Verbs	150 plus mainly irregular verbs. All tenses. Reference and test facilities.	●		●			£21	Carsondale

GAMES

Title	Description	Model A	Model B	Joystick	Keyboard	Price		Supplier
						Disc	Cassette	
5/a/Side Soccer	Superb 2 player graphic football game.	●	●	●			£7.50	IJK
Alien Swirl	Blast through clouds of swirling aliens to reach fuel tankers.	●		●		£6.95	£5.95	Amcom
Arrow of Death	(Pt 1) of an epic adventure. Your mission is to track down the source of evil.			●		£10.29	£10.29	Digital Fantasia
Arrow of Death	(Pt 2) You have found the means to destroy your enemy, far from home.			●		£10.29	£10.29	Digital Fantasia
Asteroid Storm	Destroy the asteroids and alien fighter craft as you journey through space.	●					£7.95	Program Power
Beeb Tote	A family game with colourful moving horses. Up to 6 players take turns to bet.	●		●			£5.95	Program Power
Circus	You have run out of petrol near a deserted circus tent.			●		£10.29	£10.29	Digital Fantasia
Connect 4	The object of this game is to get 4 counters of your colour in a line.	●		●			£7.50	Kay Dee
Crazy Fruit	One armed bandit program with Hold, Random Gamble, with arcade win/lose.	●		●			£5.95	Logic Systems
Curse of the Middle	A superb graphics adventure game.	●	●	●	●		£7.95	Merlin
Danger Mower	Mow some items, miss the trees, and finish the lawn before you run out of fuel.	●	●	●			£4.95	Logic Systems
Danger UXB	Run and slide from bomb to bomb, defusing them as you go.	●		●			£7.95	Micro Power
Demon Decorator	Guide your paint roller around the grid, scoring points, while avoiding the octopus.	●		●			£6.95	Micro Power
Devil's Causeway	Trapped by the Devil. Can you escape to eternity or will you be defeated?	●		●			£8.50	Kay Dee
Escape Moonbase Alpha	All action 3D graphic space adventure.	●		●			£7.95	Micro Power
Escape from Pulsar	You are trying to escape from a mutated zoo specimen.			●		£10.29	£10.29	Digital Fantasia
Feasibility Exp.	You are being used by a dying race of super beings.			●		£10.29	£10.29	Digital Fantasia
Games of Logic	For children and adults alike. The tape includes, Auction, Flip, Reverse, Telepathy and Hexa15	●		●		£9.50	£8	Golem
Golden Baton	Venture into a strange province of sorcery and evil to recover Golden Baton.			●		£10.29	£10.29	Digital Fantasia
Katakombs	Adventure game.	●		●		£9.50	£8	Golem
Killer Gorilla	Scale the ironwork to reach the Princess.	●		●			£7.95	Micro Power
Labyrinths La Cohse	An advanced adventure set in Greece. Retrieve the hidden treasure.	●		●			£7.95	Program Power
Moonraider	Penetrate the alien defences destroying fuel dumps. Four levels of difficulty.	●		●			£7.95	Micro Power
Pass Go	Pass Go is a property game of strategy similar to a well known board game.	●		●			£8.50	Kay Dee
Perseus and Andromeda	Based on Greek mythology. Battle with grotesque monsters and super powers.			●		£10.29	£10.29	Digital Fantasia
Pirate	Best ever adventure simulation for children, 2 programs.	●		●			£9.25	Chalksoft
Planet Invaders	A machine code version of space invaders, 7 skill levels.	●	●	●	●		£7.95	Merlin
Pontoon/Patience	Excellent rendition of the two popular card games.	●		●			£7.50	IJK

Fold

GALACTIC INVADERS



AS its name suggests Galactic Invaders is a cross between two well known arcade games. What the name doesn't reveal however, is the amount of pleasure to be had from this hybrid.

Here at Micro User the editor's had to ban it – otherwise we would never get any work done.

Certainly it would get our vote as one of the most enjoyable games we've ever played.

We couldn't resist squeezing this one into the issue, but space prevents us from giving full details of how it works – always assuming we could figure it out in the first place!

Listing starts on Page 102

The new Seikosha Graphics Printer.

SEIKOSHA
GP-700A

Here it is in Colour

£425
SEIKOSHA
GP-700A

Here it is in Black & White

Here it is at last, the colour graphics Seikosha printer.

Same constant reliability, same versatility and same habit of shattering price barriers – just £425.

- Unique 4 hammer head mechanism prints 7 colours or 30 shades in a single pass.
- High quality graphics with colour specification by dot units.
- Colour mixing without smearing.
- 50 characters per second whatever the colour mix.
- 80 and 106 characters per line.
- Pin feed and friction feed.
- Unique 4 colour ribbon with reinking reservoirs for long-life colour.
- Centronics Parallel interface with serial (RS232) and Video (RGB) interface options.

Telephone the number below and we'll tell you where your nearest dealer is located.

DRG
BUSINESS MACHINES

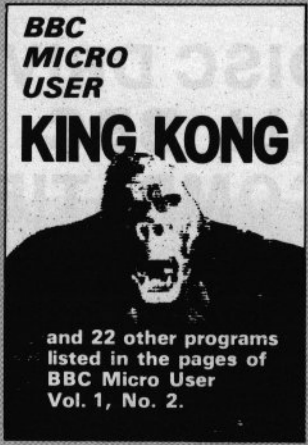
(Peripherals Division),
13–14 Lynx Crescent,
Winterstoke Rd, Weston
super Mare. BS24 9DN.
Tel: (0934) 419914.

DEALER
ENQUIRIES
WELCOME

BBC
MICRO
USER
Deathwatch
and 24 other programs
listed in the pages of
BBC Micro User
Vol. 1, No. 1.

March Issue

DEATHWATCH, a superb arcade game that challenges you to use your skill to fight off enemy battleships, tanks and helicopters; **BINGO**, illustrating clever uses of the randomise function; **BUBBLESORT** routines; **TESTS** for function keys in machine code routines; a useful **CASSETTE BUGS FIX** for users with OS 0.1 . . . and many **COLOUR** and **GRAPHICS ROUTINES** to help you create a kaleidoscope of screen designs which you can incorporate into your own programs.


BBC
MICRO
USER
KING KONG
and 22 other programs
listed in the pages of
BBC Micro User
Vol. 1, No. 2.

April Issue

KING KONG, a fast moving game in which you pilot a helicopter to rescue girls perched on the Empire State Building before killing Kong; **GRAPHICS**, a suite of colourful demonstration programs; **NIM**, a structural game of strategy; **TOKENS**, first steps in unravelling the Basic ROM; **HOROSCOPES**, a fun program with useful error-trapping routines; **FORMATTER**, an essential disc utility; **DISASSEM**, a full machine code disassembler; **HEAT & LIGHT**, two measuring and plotting programs.

BBC
MICRO
USER
AIR STRIKE!
32K
and 33 other
programs listed in the
pages of BBC Micro User
Vol. 1, No. 3

May Issue

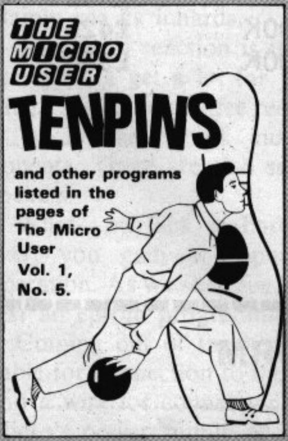
AIR STRIKE, a fast and furious arcade game that invites you to put your wits against maurading warplanes; Test your mental powers with **PELMANISM**; **25 ANAGRAMS** for you to solve; **CHARACTER**, to generate vertical and inverted text; **TELETEXT**, animation in Mode 7, really brings the screen to life; **LAB**, a trio of programs to interface laboratory equipment; 10 programs to investigate the **OSBYTE** routine; **BEEB**, two joystick exercises; plus more **COLOUR** and **GRAPHICS** routines.

THE
MICRO
USER
SPACE PILOT
and other programs listed
in the pages of
BBC Micro User
Vol. 1, No. 4.

June Issue

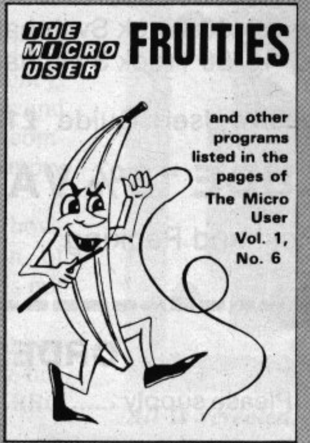
SPACE PILOT, lost in space with dwindling fuel supplies, you must fight off repeated attacks from alien life forms. To replenish fuel, you have to perform a tricky docking manoeuvre, while to repair the inevitable damage you must land on a mountainous planet. **NOMISM**, you are a nomadic herdsman desperately trying to eke out a living on the plains of Africa. Can you survive drought, tsetse fly and other hazards? A game that also helps to teach geography. **PLUS** other listings from the June issue.

We've got it all taped!


THE
MICRO
USER
TENPINS
and other programs
listed in the
pages of
The Micro
User
Vol. 1,
No. 5.

July Issue

TENPIN, a highly entertaining simulation of Tenpin Bowling; **SPACEPODS**, Try to beat alien hordes; **CUP**, Exciting techniques to bring 3D graphics to the BBC Micro; **SCRSAVE** and **CSRLOAD**, Two programs to allow you to save and load screens to tape or disc; **TEST** and **STEADY**, A pair of programs to accompany the Beeb Body Building Course; **BREAKFIX**, Don't let the Break key destroy all your precious variables! **FORMAT**, Creates neater listings which are much easier to read.


THE
MICRO
USER
FRUITIES
and other
programs
listed in the
pages of
The Micro
User
Vol. 1,
No. 6

August Issue

FRUITIES, driven by strange urges you climb the ladders of adventure to risk all in the gardens of unearthly frights. Can you survive all the terrors that await you, or will you, too, fall victim to the evil Fruities? A really superb game. **ANIMATION**, a suite of programs that show you how to really bring your screen alive — an essential part of our course on animation on the BBC Micro. **CASDISC**, The essential machine code downloader for your disc system; **PLUS** other listings from the August issue.

THE
MICRO
USER
Robin
and
Marian
and other
programs
listed in the
pages of
The Micro
User
Vol. 1,
No. 7

September Issue

ROBIN & MARIAN, a highly-challenging game in which you play the part of Robin Hood rescuing Maid Marian from the clutches of the Sheriff of Nottingham. **GALACTIC INVADERS**, an extremely well-written cross between two well-known arcade games. **DFS BENCHMARKS**, 14 programs to test out disc filing systems. **ANIMATION**, four programs to teach new techniques. **TERMINAL**, three programs to connect a BBC Micro to a mainframe. **PLUS** other listings from the September issue.

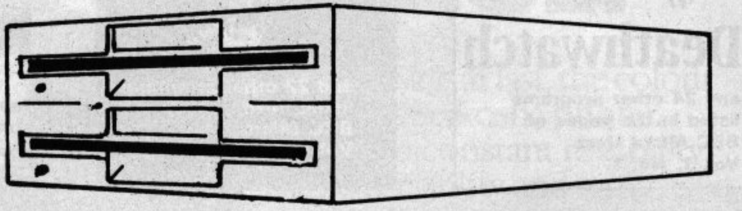
£3.75
each
(incl. p&p)

Save wear on your fingers — and ensure your programs are error-free — with the top-quality cassettes of programs listed in The Micro User.

ORDER FORM ON PAGE 77

Viglen Acrylics Limited BRING DIRECT FROM MANUFACTURER UNBELIEVABLE PRICES

DISC DRIVES ALL BBC COMPATIBLE



FULL WARRANTY ON ALL DISC DRIVES

All drives are ready cased in BBC matching colour and are complete with leads. Just plug into your BBC Micro and you're ready to go.

COME AND BUY FROM US IN AUGUST AT THE
ACORN USER EXHIBITION – STAND 43

LATEST OLIVETTI DRIVES

Single Drives:	
● 40 Track 100K	**£155**
● 40 Track 200K	**£190**
Dual Drives:	
● 40 Track 200K	**£325**
● 40 Track 400K	**£395**
● D.F.S. Fully Tested including fitting	**£105**

TEACS AND CANNON SLIMLINE DRIVES

Single Drives:	
● 40 Track 100K	**£174**
● 40 Track 200K	**£230**
● 40/80 Track Switchable 200K	**£207**
● 40/80 Track Switchable 400K	**£269**
Dual Drives:	
● 40 Track 200K	**£365**
● 40/80 Track Switchable 400K	**£425**
● 40/80 Track Switchable 800K	**£550**

- Disc Formatter – Comprehensive Users Guide **£18**

ALL PRICES INCLUDE 15% VAT

Please add £8.00 for Post and Packing

Complete order form and send together with cheque or postal order made out to:

VIGLEN COMPUTER SUPPLIES,
Unit 7, Trumpers Way,
Manwell W7 2QA.

Or phone in order with B/card or Access No.

01-843 9903

ORDER FORM

Please supply ....
Type and make of drive ....
Quantity ....
I enclose cheque/PO for ....
My Access/Barclaycard No. ....
....
Name ....
Address ....
.... MU 2

Educational establishment orders welcomed.

BOOT SELECTION
ATPL Advanced Technology Products Limited
A.T.PROMMER
EPROM PROGRAMMER WITH AUTO-RUN
PROGRAMMING SOCKET

An eprom programmer.. that's NOISY but NICE!

THE first surprise with the ATPL eprom programmer is that it has no base. If you turn it over you can plainly see its innards.

The initial reaction is that for £120 you do not get a lot for your money. There are six ICs, three reed relays and a small handful of auxiliary components. There are also several empty sockets.

What you lack in hardware, however, you gain in sophistication of operation. As we shall see later, it is not *just* an eprom programmer.

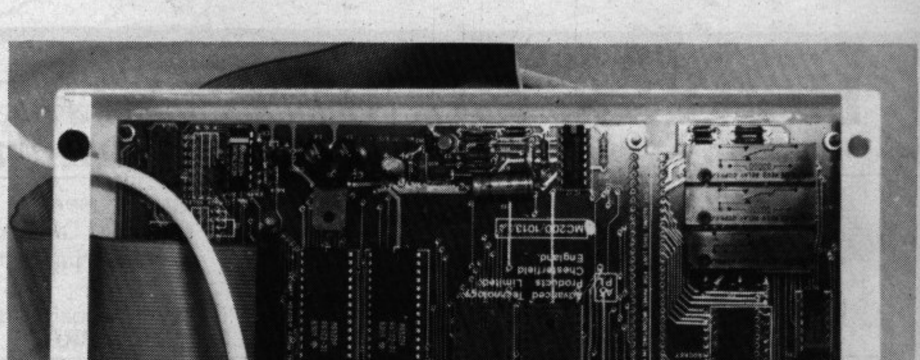
Coming out of the box is a ribbon cable for connection to the 1 MHz bus and a wire for connection to the BBC Micro's power supply socket.

If you have Acorn disc drives, you will have to disconnect them as they require this power socket.

The wires are just about the minimum possible length and at the price could have been slightly longer to enable you to have some choice about where the unit is placed.

The eprom programmer comes with software to enable you to read and blow eproms of many different type. Those supported are the 2516, 2716, 2532, 2732, 2564, 2764 and 27128.

For some types of eprom you have to remove or make a link inside the programmer. I think this could have been brought out to a switch on the outside of the case for convenience.



All is revealed: The underside of the ATPL eprom programmer

It is also possible to read from one type of eprom and copy onto another. The software provided is basically an eprom copier and there are no provisions for altering the contents before the new eprom is programmed.

To do this you would have to save the buffer memory space and then write a program to edit it, which would be quite a tricky job. Nevertheless, as an eprom copier it works very well.

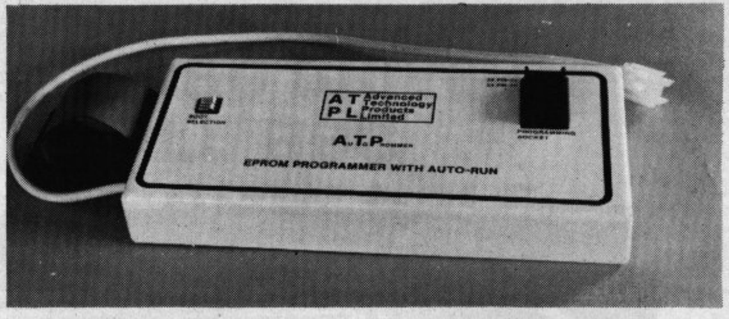
As well as testing whether your new eprom is blank you can read and blow it and also verify that it has been programmed correctly.

When the device is in the act of programming, strange low level noises can be heard emanating from the speaker in the BBC Micro.

Also as each block is programmed a number is displayed giving both assurance that it is still working and an

⟶

From Page 57


A T Advanced Technology Products Limited
A.T.P
EPROM PROGRAMMER WITH AUTO-RUN
PROGRAMMING SOCKET

estimation of how much longer it is going to take.

It takes approximately 50mS to program one location. So for a 16k eprom it is going to take about 14 minutes.

An additional feature of the ATPL eprom programmer is that one can install eproms in the spare sockets and have the programs in them automatically downloaded and run. These can be either machine code or Basic programs.

So you can have your favourite program run instantly when you power up. The manual explains exactly how to do this.

Unfortunately the manual suffers from the usual problems, although it sets off by trying to be user friendly and explain every step.

For instance, it tells you to adjust your volume control if you have difficulty loading the tape in. Then it springs on you terms which only someone reasonably familiar with machine code would understand.

I found it a little short on detail, but all the facts are there if you know what you are looking for.

For the price I would have thought that there would have been a zero force insertion socket provided for the eproms. Unfortunately this is not the case.

While the socket does not subject the eprom to the usual amount of strain it does require it to have its legs straightened. This oversight rather spoils the ship for a ha'pe'th of tar.

In conclusion the ATPL eprom programmer offers the capability of programming many different types of eproms – certainly most of those that you would want to programme for use with your BBC Micro.

In my experience the capability to store programs within the eprom programmer and download them is unique and should prove valuable for anybody who has not got disc drives.

The unit is constructed to a high standard and should be reliable in operation. I have programmed several types of eprom with it and apart from trouble getting some of my devices into the programming socket, the unit has worked well.

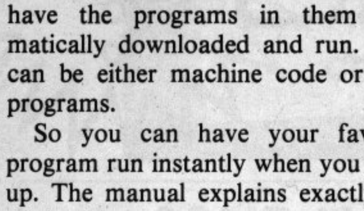
If you need the capability for programming many different types of eprom then this certainly fits the bill.

Despite my criticisms of details of the design I have ordered one for my micro laboratory. But then, I wasn't spending my own money ...

Mike Cook

Home & Business Computers

THE NORTH'S LEADING COMPUTER SUPPLIERS



HARDWARE

BBC MODEL B	**£399**
DISC I/F KIT	**£79.00** (Fitted)

Wide range of add-ons

RING FOR ELECTRON DELIVERY & PRICE

DISC DRIVES
(inc. Utilities Disc and Manual)

TEAC 100K single sided	£230
Teac 200K single sided	£305
Teac 400K double sided 80 track	£397
New Slimline 100K disc drives	£205

Plus LVL/Acorn Disc Drives

QUICK SHOT JOYSTICK
Deluxe Contour Grip, 2 Firing Buttons (base & grip) Rubber suction feet. **£15.95**

BUG-BYTE SOFTWARE
BBC
BACKGAMMON

SOFTWARE – from £4.50
Micropower, Salamander, Digital Fantasia, Acornsoft, IJK, BBC Soft, Bug Byte, etc.

ALL PRICES INCLUDE VAT AT 15%

PRINTERS AP 100A **£229** SPARKJET **£420**
RX 80 **£299** MICROLINE 80 **£229**

SEND FOR PRICE LIST

SERVICE AND SUPPORT BY FERRANTI

OLDHAM
54 Yorkshire St., Oldham, Lancs.
Tel: 061-633 1608

ROCHDALE
73 Yorkshire St.,
Rochdale
OPENING 8th SEPTEMBER

EDUCATION AND BUSINESS USERS
We offer:
- **Wide range of Business and Educational Software.**
- **Educational and bulk order discounts.**
- **Warranty and post warranty maintenance.**
- **On site maintenance if required.**
- **Collection and delivery of repairs if required.**

Contact Frank Ratcliffe
on 061-633 1608

UK MAINLAND MACHINE DELIVERY £5.00

BARCLAYCARD VISA

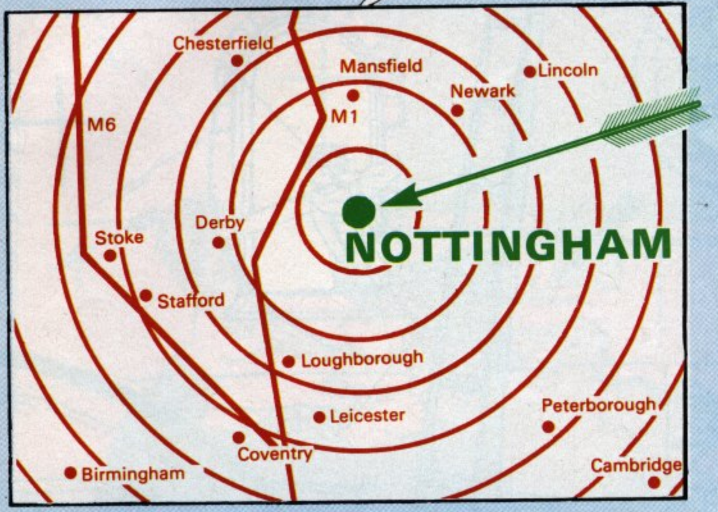
Database Publications present
THE BBC MICRO USER SHOW

We go right to the heart of England for the second BBC Micro User Show!

Sherwood Rooms, Nottingham

10am-6pm Friday, September 16
10am-5pm Saturday, September 17
10am-4pm Sunday, September 18

- **Try out all the latest games before you buy**
- **See what's new in add-ons for the BBC Micro**
- **Put your questions to Britain's top experts**


Chesterfield
Mansfield
Lincoln
Newark
M1
M6
NOTTINGHAM
Derby
Stoke
Stafford
Loughborough
Leicester
Peterborough
Coventry
Birmingham
Cambridge

This is where you'll find the answers to all your questions about the BBC Micro

Now the BBC Micro User Show comes to the Midlands. It's the biggest collection of BBC Micros – plus all the hardware and software that goes with them – that the region has ever seen.

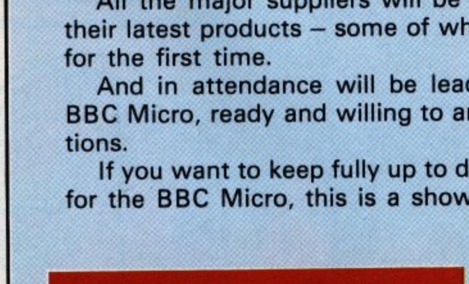
All the major suppliers will be there, displaying all their latest products – some of which will be on show for the first time.

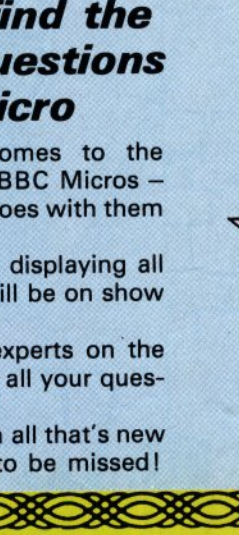
And in attendance will be leading experts on the BBC Micro, ready and willing to answer all your questions.

If you want to keep fully up to date on all that's new for the BBC Micro, this is a show not to be missed!

Cut out this coupon for another action-packed 3-day event that's bang on target

How to get there


MAID MARIAN WAY
BROADMARSH SHOPPING CENTRE
COLLIN STREET
P
P
← M1
CASTLE BOULEVARD
WILFORD STREET
SHERWOOD ROOMS
BROADMARSH BUS STATION
CANAL STREET


THE BBC MICRO USER SHOW

£1 off normal exhibition admission price of £2

Sherwood Rooms
Nottingham

Friday - Sunday
September 16 - 18
1983

Name ....
Address ....
....
....
Tel No. ....

Organised by Database Publications

Voucher not valid without above details

Robin to the rescue

A WISTFUL Maid Marian, lonely prisoner of the wicked Sheriff of Nottingham, stands forlornly on the battlements of Nottingham Castle. Archers are in position, ready to let fly their arrows – or to fling down cauldrons of molten lead onto any foolhardy rescuers.

This is the scene that greets you at the start of this month's Micro User game that invites you to assume the mantle of brave Robin Hood and rescue Maid Marian from the evil Sheriff's clutches.

Every time you hit an archer another piece of magical ladder appears, which you will have to climb to pluck Marian to safety. But if you lose one of your four lives the ladder vanishes.

However time is not on your side, and the sky begins to darken as evening approaches . . .

→

If you can buy it cheaper we'll refund the difference.*

This month's offer is another winner – a consignment of 14" R.G.B. colour monitors manufactured by J.V.C. – at prices never seen before in the U.K. Suitable for use with BBC Micro. Lynx, Oric, Apple II, Apple III and IBM etc.

Its safe to put a cheque in the post today. Because, if you find someone who's cheaper, we'll refund the difference.

RGB MEDIUM RES £199.00

Resolution, 370 x 235. Pixels.
Display, 80 characters x 25 lines. Slot Pitch 63mm.
Input, Video – RGB Analogue with TTL input.
SYNC – Separates SYNC on RGB. Features, On/Off switch with pilot light. Brightness control.
Power 220/240v 50/60HZ.

RGB HIGH RES £299.00

Resolution, 580 x 235. Pixels.
Display, 80 characters x 25 lines. Slot Pitch 41mm.
Input, Video – RGB Analogue with TTL input.
SYNC – Separate SYNC on RGB.
Features, On/Off switch with pilot light.
Brightness control. Power, 220/240V 50/60 HZ.

IBM COMPATIBLE £349.00

Spec as above with IBM Interface.

12" GREEN SCREEN MONITOR

One year warranty, ex stock delivery, 18 MHZ, Phono connector. Limited quantity. **Only £69.95**

Lead to connect to BBC **£5.95**

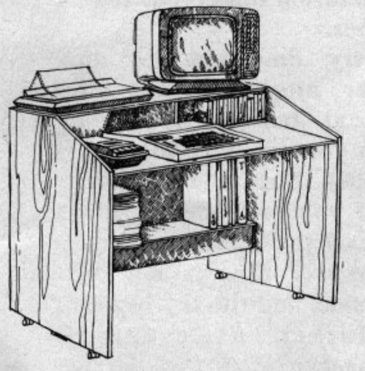
NASHUA FLOPPY DISCS

Minis

S/S S/D	£16.95 for 10	S/S S/D	£17.95 for 10
S/S D/D	£19.95 for 10	S/S D/D	£23.95 for 10
D/S D/D	£22.95 for 10	D/S D/D	£24.95 for 10
S/S 80 Track	£24.95 for 10		
D/S 80 Track	£26.95 for 10		

With full 5 year warranty. All mini discs have hub rings and a FREE plastic library case.

THE ORGANIZER DESK

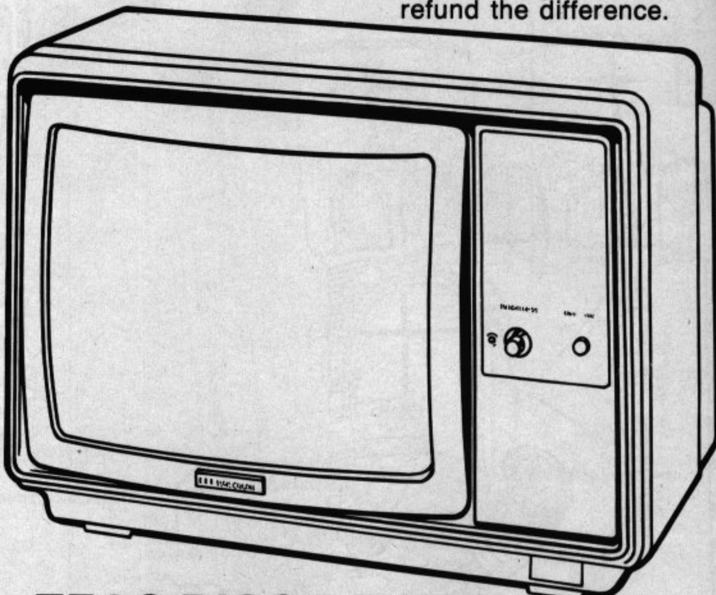


ONLY
£49.50

- Teak finish
- On castors
- Self assembly
- Full instructions provided
- Top shelf for monitor/printer
- Large desk top area
- Lower shelf for paper/book storage – ample room in front of the shelf for you to sit comfortably.

DOGFIGHT

If you have a BBC 32K with any O.S. become a flying ace with our wonderful new game Dogfight. An exciting 2 player game with 8 levels of difficulty. **Only £8.65**



TEAC DISC DRIVES

TEAC 55F D/S 80 Track Drive.

* Single Drive in case complete with all leads **Only £249.95**
(gives single density 400K double density 800K)

* Dual Drive in case with own P.S.U. and all leads **Only £499.95**
(gives single density 800K double density 1.6 MB)

* Uncased Drive **£229.00**
Single Ribbon Lead £12.00 Dual £15.00
Single Power Leads £5.00 Dual £6.00
Dual Case with PSU + Blanking Plate £39.95

Ideal for use with BBC Micro. Full warranty. Low power consumption. Slimline lastest technology. Switchable 40/80 track.

JAPANESE DISC DRIVES

Canon or TEAC 55A 5¼" S/S 40 Track. Formatted single density 100K. Double density 200K. **£129.95**

Case to hold single drive **£9.95**
Leads as with TEAC DRIVES

Our price pledge only applies to the JVC monitor

To Order: Add carriage at the following rates:- Disc 85p. Others goods £7.00. Add VAT at 15% to total and send your order to:

OPUS SUPPLIES

158, Camberwell Road, London, SE5 0EE
Tel: 01-701 8668 (3 lines) 01-703 6155/6/7

Government and Educational orders welcome.

From Page 61

MAJOR VARIABLES

A%	False if baddies are too animated
B%	True if bomb is to be animated
D%	True if Robin is dead
E%	Present (Y) position of the ladder
G%	True if Robin wins
J%	Present arrow X co-ordinates
K%	Ascii values of key being pressed
L%	Present arrow Y co-ordinate
M% **N%**	Loop counters
P%	Current level
R%	Last arrow X co-ordinate
S%	Last arrow Y co-ordinate
T%	Bonus remaining
W%	Baddy's X co-ordinate
X%	Ribin's X co-ordinate
Y%	Robin's Y co-ordinate
Z%	Baddies Y co-ordinate
V%	Robin's _X vector
AX%	Baddy's last X co-ordinate
BX%	Bombs X co-ordinate
AY%	Baddies last Y co-ordinate
BY%	Bombs Y co-ordinate
OX%	Robin's last X co-ordinate
OY%	Robin's last Y co-ordinate
OBX%	Bombs last X co-ordinate
OBY%	Bombs last Y co-ordinate
NCAR%	Robin's present character type
OCAR%	Robin's last character type
MAN%	Number of lives remaining
SC%	Score to date
name$(N)	Array holding names on hi-score table
score(N)	Array holding scores on hi-score table

MAJOR PROCEDURES

PROCerror	Error handling routine
PROCinit	Sets up envelopes, user defined characters, dimensions, arrays, and sets up hi-score table
PROCheader	Title header and hi-score display
PROCtitles	Instructions
PROCsetup	Sets all variables for next screen
PROCdrawcastle	Calls procedures to draw the screen
PROCmoverobin	Sets up Robin's co-ordinates and fires if space bar pressed
PROCshoot	Animates Robin's "arrow"
PROCbomb	Animates Baddy's "bombs"
PROCdead	Flashes colour if Robin hit
PROCbadguys	Moves the baddies
PROCfire	Initialise to fire an arrow
PROCplotrobin	Animates Robin
PROCplotbaddie	Animates baddies
PROCthemhit	Increment score, kill and move displayed baddy
PROCwin	Plot heart, and add on any bonus
PROCend	Displays the ending sequence
PROChiscores	Decides if score is in top 20, and if so, asks for name
PROCdisplay	Displays high scores
PROCsky_moat	Draws sky and moat
PROCtower	Draws the two towers
PROCcastle	Draws the main body of the castle
PROCwindows	Puts the windows in
PROCbattlement	Draws the battlements
PROCletters	Prints score, bonus, and lives remaining
PROCdoor	Puts the door on
PROCmarion	Draws Marian in 3 colours

Listing starts on Page 95

AEROSPACE SYSTEMS DEVELOPMENTS LTD

Besides offering a 'direct duplicating service' both for cassette and 5¼" disc, we are also selling a whole variety of usual and unusual items, for the BBC Micro, listed below:

HARDWARE
Biomedical amplifier **£30.43**
Lightpen and utility software **£35.00**
Extender board (adds 64k of EPROM or 16k RAM) **£29.47**
Eprom programmer **£60.00**
Eprom eraser .... with timer **£30.00** without **£25.00**
Wabash diskettes
5¼" **£2.25** each .... (SS, SD) 40 Track or boxed (10) **£16.00**
5¼" **£3.25** each .... (DS, DD) 80 Track or boxed (10) **£25.00**
Other discs include Maxell, Dysan, Memorex .... P.O.A.
Various printer ribbons, blank cassettes, cassette labels, Continuous stationery 11.5 by 9.5
1000 sheets **£6.50**
2000 sheets **£13.00**
(Carriage £1.50 and £2.80 on paper above)
Various printers, (example) STAR 510 .... **£277.00**
STAR 515 .... **£377.00**
(Carriage £7 on printers)
Manual for Disc upgrade **£2.50**

SOFTWARE
WORDPROCESSOR (cassette and manual) **£8.50**
Tape based 4k program. Fast operation with search and replace, insert and closeup, line length up to 240, justification, any page length.

MAILER **£7.50**
Tape based mailing list program. Auto search for named records – any length up to 240 characters. Sort and merge save and load all or part of lists.

UTILITY **£7.50**
Contains various utilities such as screen print and save, string and integer sort a disassembler, tape and bad program fix, graph plotter up to 5 curves.

Tape and disc copying. Fast professional copying of cassette and disc. Prices on application, but around 40p per single sided cassette for quantities up to 500. This includes labels and plastic box. Post and packing extra (£2.50 up to 50 off, £1.00 for each extra 75 off).

Free general guide to using discs and printers – no charge, just a stamped addressed envelope!

PROGRAMS REQUIRED! 40% royalties and you keep copyright! Games, utilities, applications packages. Dealer enquiries welcome!

• Our previous prices (see 'Micro User July/August' will remain static until first post 15th September, 1983
If you would like more information on our services and products, just write to the address below:
SPECIAL OFFER! ASD 5¼" diskettes SS SD40 £1.99 each DS DD80 £2.99. Ask for quantity discounts!
Send cheques and postal orders to:
ASD Ltd., 30 West End, Launton, Bicester, Oxon. Tel: 08692 2831
(No cheques cashed until goods ready for dispatch) Except where stated, prices include VAT and carriage.

AS SEEN ON SWEDISH TV

FINANCIAL GAMES

GREAT BRITAIN LTD.

Ever thought you could run the country better?

Here is your chance.

As Prime Minister (of the party of your choice), you have to guide the country through its social and economic ills for five years, then put yourself up for re-election.

"Great Britain Ltd is easily as exciting, and certainly more satisfying, than any game of space invaders"

Micro User, June '83

"A must for all budding politicians"

Computer Answers, June '83

"Thoroughly enjoyable and worthwhile decision-making activity and, as such, it can be thoroughly recommended"

Educational Computing, June '83

£5.95 with full instructions

INHERITANCE

Have you ever wondered what you'd do if you came into some money? Would you be able to invest it and watch it grow, or maybe start a small business and become a millionaire. With Inheritance you have the chance to find out.

"A great game, really two games for the price of one"

Micro User, June '83

£5.95
with full instructions

WORLD TRAVEL GAME

A game for 1 or 2 players. Rush around the world collecting souvenirs. Keep your head and try to avoid the dangers inherent in such a journey.

"Exciting, competitive and even educational – not to be missed"

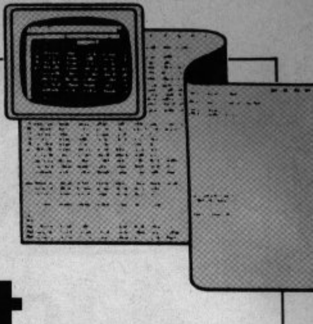
£6.95
with world map and full instructions

★ Special Offer to Micro User readers ALL 3 GAMES £16.95

SIMON W. HESSEL SOFTWARE

(Dept. B1)
15 Lytham Court, Cardwell Crescent, Sunninghill, Berks.
Telephone: Ascot 25179

24HR DESPATCH – PLEASE ADD 30p P & P
– UNLIMITED GUARANTEE –



Beebcalc... the prudent businessman's lifesaver

By JON VOGLER

CLOSURE! Liquidation! Bankruptcy! In an era when such headlines are all too familiar, how can the micro computer help the businessman avoid them?

Forecasting and budgeting probably prevent more crises than any other financial or managerial techniques. Plans are made of monthly activity for one or two years ahead and actual performance regularly compared with the plan.

Departure from the plan or variance is easy to spot and its likely effect on the whole business calculated before it becomes too serious, allowing time for remedial action.

Such plans can cover many activities to a fine degree of detail. A factory's use of manpower can be categorised by different skills, by departments or cost centres, by age or sex or training requirements.

A transport organisation can plan its vehicle utilisation, broken down by type, tonnage or depot. A sales force can express its targets in terms of different products, territories or markets.

The most common plan is the financial budget, which expresses such ideas in financial terms, comparing income from different kinds of sales with the expenditure needed to achieve them.

This may cover wages and salaries, rent of premises, insurance costs, raw materials, and a wide variety of other resources and costs.

Such financial forecasting not only shows the likely profit or loss at the end of the coming year, but can also show cash flow, the vital blood supply by which businesses live.

So what's the problem? Why doesn't every business plan in this way? Time, of course! To carry out these admirable techniques properly takes many, many man hours.

Busy executives, caught up in the hurly burly of commercial life, tend to put them off until later – or too late!

And once done they need to be recast, perhaps time and again, to match changing policies or circumstances, a task that is often neglected because of the tedious labour involved.

A micro program to lighten such toil is thus extremely welcome to the competent manager and I predict that Beebcalc will soon attract a wide circle of admirers and sell briskly to small businessmen and industrialists.

Not only does it reduce the birth-pangs of the budget or plan, but it makes change and recalculation utterly painless.

Beebcalc is really very simple. It sets out a table of columns (any number up to 26) and rows (up to 50) into which the user can enter his budgets, using text or numbers.

It allows him to alter the width of columns, to define how each column entry is presented, and to use a formula to calculate every entry in a column or row.

This could be a function of some other entry or, for example, could be determined by the number of working days in a given month: normally a most laborious adjustment but peanuts with Beebcalc.

Most valuable of all, the entire table can be recalculated as required or, if wished, every time an alteration is made.

I can recall innumerable conversations with my accountant: "Take it away and see what it looks like if we increase the sales of these and reduce the cost of that".

He would go away with a glum face and, 24 hours later (if we were lucky), would reappear with the altered document.

Too many changes and he reached resignation point! With Beebcalc the effects of such changes could be visible within a couple of minutes in a wreath of accountant's smiles.

All necessary facilities are provided to save data on file. Tape would be little less convenient than disc. Sadly, no provision is made for including a disc drive number in addition to a seven character filename – a thoughtless oversight as many businessmen will operate dual disc drives.

Printing also suffers from too short an input "slot". Provision is made for defining a £ sign to suit the peculiarities of the individual printer, but with capacity for only three characters. My own printer, for example, requires no less than five.

Other criticisms concern the user guide. Any one of 11 routines can be selected by pressing a single key, but only if the caps lock is engaged. When I started using the program I entered my various expenditure sub-headings using lower case type, as a result of which the program appeared to jam whenever I selected a command. A telephone call to Gemini soon cleared this up, but a note in the guide could have avoided my frustration.

I also failed to understand an arrangement that offers dual choices of operating procedure. The user guide explanation depends upon the reader knowing what a "toggle" is. This small businessman is a newcomer to computers, and thought it was something used by boy scouts.

I would recommend compilers of micro guides to assume total ignorance of jargon among their readers. This apart, the guide is comprehensive and helpful, as is the sample file illustrated and provided on the disc.

The program is not, of course, restricted to business planning. It could be used wherever data needs to be presented as a spreadsheet, such as the presentation of scientific and technical data, the execution of engineering or other calculations or the production of timetables or fare charts.

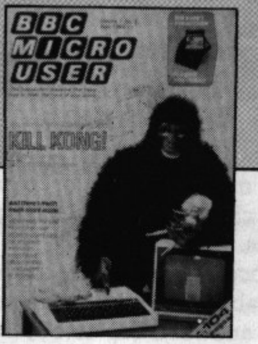
It has often been said that computers win most friends where many calculations are performed on data that is subject to frequent changes, and Beebcalc demonstrates the truth of this.

It is an excellent small business program, well worth £19.95 on tape or £23.95 on disc.

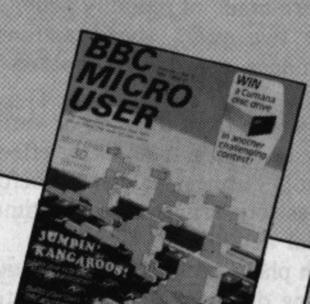
Make sure your Micro User collection is complete!

BBC MICRO USER
FREE!

March issue
Beginners: guide to the keyboard. Build your own games paddle. Alphabeta word processor review. Guide to text colours and graphics. BBC operating system, Part 1. How to avoid cassette loading problems. Deathwatch listing. Upgrade Model A to B at half the shop price. Shapes program. Bingo listing. Sorting routines. Test for function keys in machine code routines. Colour monitor review, Part 1.


BBC MICRO USER
KILL KONG!

April issue
Beginners: simple programming techniques. Produce impressive graphics with Teletext Mode 7. Common copying errors revealed. How to draw multi-coloured lines. King Kong listing. BBC Operating System, Part 2. Colour monitor review, Part 2. Upgrade Model A to B, Part 2. Finding the ROM's action addresses. Binary code and how to use it. Disc formatter listing. Plus 8-page pullout: essential reference guide for Basic programmers.


BBC MICRO USER
WIN a Cumana disc drive
in another challenging contest!
JUMPIN' KANGAROOS!
AIR STRIKE

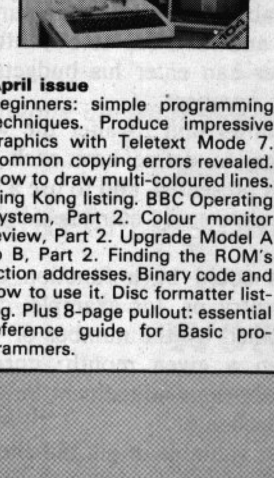
May issue
Beginners: string variables. Pelmanism listing. Mode 7 animation, Part 2. Interfacing in the laboratory. How to generate vertical or even inverse text. Graphics course: triangles and rectangles. Build yourself a joystick. The Osbyte routine: full investigation. Air Strike listing. Anagrams listing. Structured programming, Part 1. How to make full use of the BBC's editing function. Medprom eprom programmer review.

Back numbers are still available at £1.25 (incl. p&p)

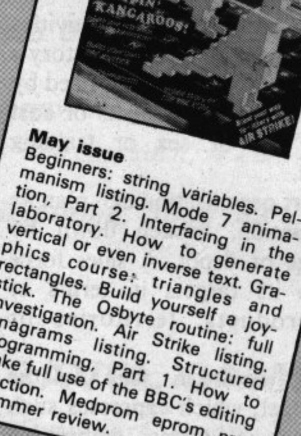
ORDER FORM ON PAGE 77

All you want to know about the BBC MICRO!
THE MICRO USER
WIN
Hong Kong

June issue
Beginners: Use of the INPUT statement. Editing course: LIST and LISTO. BBC speech chip review. Structured programming, Part 2. Solving cassette problems. Build your own graphics digitiser. Hidden *FX calls. Guide to indirection operators. Single key memory display program. Space Pilot listings. Graphics course: text and graphics windows. Nomsim listing. Bringing user defined characters to life. Guide to Software for the BBC Micro.

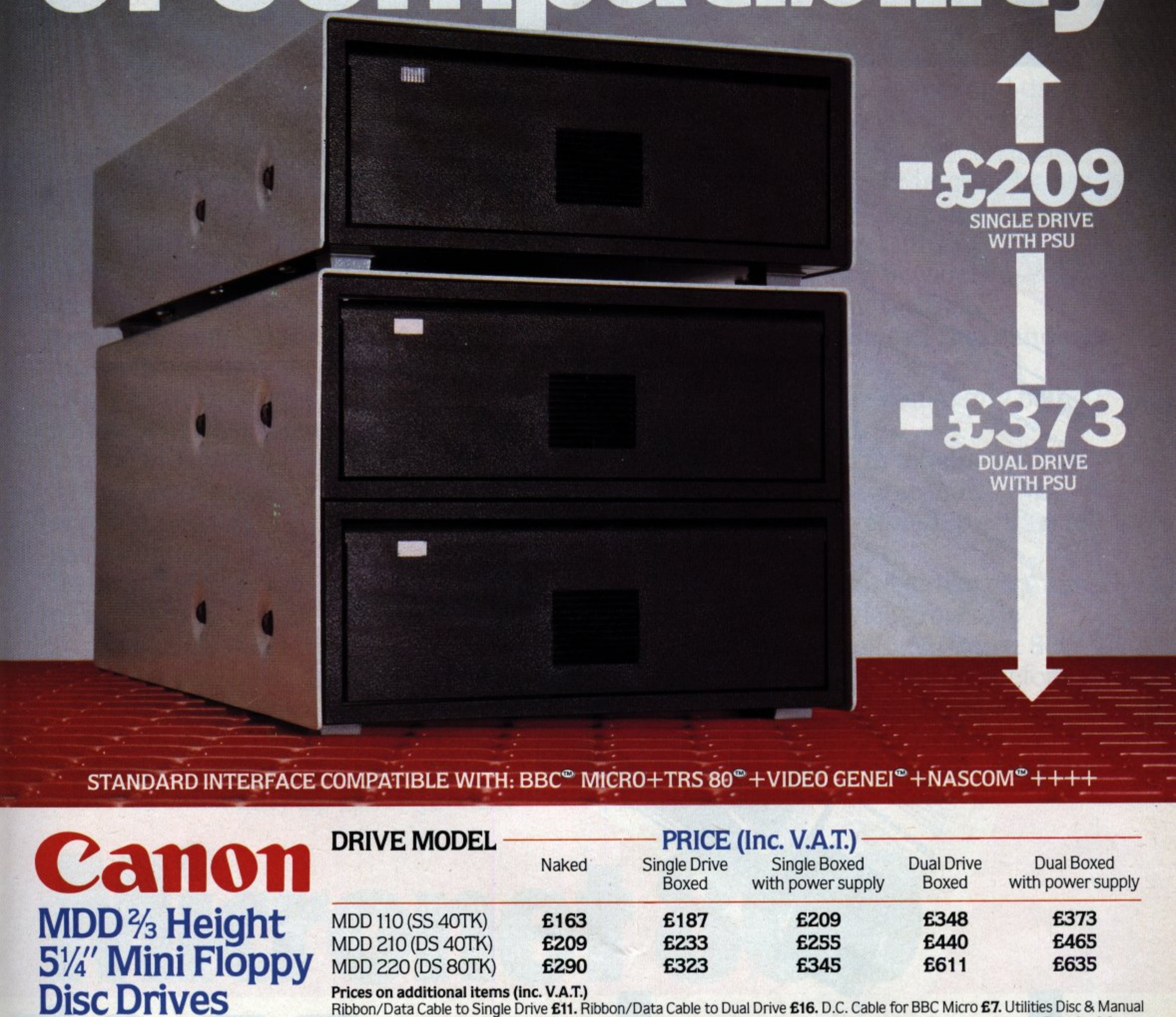

All you want to know about the BBC MICRO!
THE MICRO USER
WIN
Epson's latest £500 printer

July issue
Beginners: loops. Ten Pins listing. Editing course: the PRINT statement. Graphics course: creating sunburst effects. Structured programming, Part 3. How to use the user port to maximum effect. Space Pods listing. Wordwise review. Epson FX80 printer review. The BBC Micro as a sophisticated design tool. Hexadecimal highlights. How to edit with impunity, and fix that break key. Guide to Software for the BBC Micro.


All you want to know about the BBC MICRO!
THE MICRO USER
WIN
TALKING TURTLES!

August issue
Beginners: more help on loops. BBC Micro User's Manchester show reviewed. Animation, Part 1. BBC Buggy and Edinburgh Turtle reviewed. Easy techniques for switching from tape to disc. Structured programming, Part 4. Inside King Kong: case study of the popular game. Fruities listing. A guide to logical operators. Machine code routines to give Mode 7 colour. Build your own dual cassette system. Guide to Software for the BBC Micro.

The height of compatibility



STANDARD INTERFACE COMPATIBLE WITH: BBC™ MICRO+TRS 80™+VIDEO GENEI™+NASCOM™++++

Canon

MDD ⅔ Height 5¼″ Mini Floppy Disc Drives

DRIVE MODEL	PRICE (Inc. V.A.T.) Naked	Single Drive Boxed	Single Boxed with power supply	Dual Drive Boxed	Dual Boxed with power supply
MDD 110 (SS 40TK)	£163	£187	£209	£348	£373
MDD 210 (DS 40TK)	£209	£233	£255	£440	£465
MDD 220 (DS 80TK)	£290	£323	£345	£611	£635

Prices on additional items (inc. V.A.T.)
Ribbon/Data Cable to Single Drive **£11.** Ribbon/Data Cable to Dual Drive **£16.** D.C. Cable for BBC Micro **£7.** Utilities Disc & Manual for BBC Micro® **£20. N.B. The MDD 220 is selectable 40/80 TK with L.E.D. mode display. Boxed units are fitted with an external 40/80 TK switch.** U.K. carriage on any size of consignment **£10.**

Lower Profile, Higher Performance & More Data Capacity

The MDD range of floppy disc drives includes units giving capacities from 250K unformatted (MDD 110) to one megabyte of unformatted data (MDD 220). They support both MFM and FM recording formats and incorporate the superior reliability, maximum performance and extended service life inherent in all Canon products.

DISC DRIVE UNFORMATTED CAPACITIES

Drive Model	Single Density (FM)	Double Density (MFM)
MDD 110	125K	250K
MDD 210	250K	500K
MDD 220	500K	1000K

Dealer enquiries welcome

MDD SINGLE/DUAL BOXED & PSU.

ALPHA DISC LTD

UNIT 2, CRABTREE ROAD, THORPE INDUSTRIAL ESTATE, EGHAM, SURREY TW20 8RN.
TELEPHONE: (0784) 35357/8/9

BBC microcomputer
MICRONET 800
BBC Micro
6.00 Free Games
7.30 Get the Facts
10.55 Communicate
12.30 User Groups
2.15 Learn with Micronet 800
3.40 Work with Micronet 800
5.15 Get into Prestel
6.05 For the Investor
7.30 Plan Your Travels
9.00 Win Big Prizes
10.15 Communications Developments
11.30 Looking to the Future

tunes your BBC i
of news, views, fa

See us on Stand No. 439,
Personal Computer World Show,
28 September–2 October
Barbican Centre,
City of London

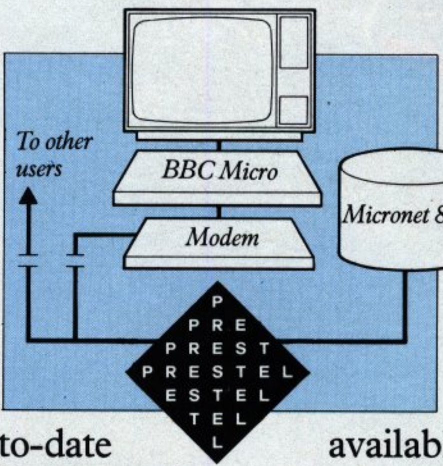
Tune your BBC micro to a huge database of information, hundreds of software programs, and communication with other users.

The BBC micro. The first to connect to the fast expanding Micronet 800 service. Now you can choose from a range of modems and software packs – including the easy and convenient software on ROM – to connect your BBC Model B, via the telephone line, to a system that will give you more than you ever dreamed possible.

Micronet 800 is fun, friendly and inexpensive to run. Choose from hundreds of free games, download and use them on your BBC whenever you like, play on-screen games (as easy – and inexpensive – as a local phone call), and compete in Big Prize games and quizzes. There's also a range of downloadable games you can buy for less than over-the-counter prices.

Learn through up-to-date education packages, and help run the household with simple business packages. And if you need fast facts about the world of computers, Micronet 800 provides constantly up-dated product comparisons, reviews, prices, dealership and 'best-buy' information – 24-hours a day, 7-days a week.

You can also access the full range of Prestel™ services. These include a comprehensive information service offering you up-to-date news, weather and many other topics of immediate interest. You can join Homelink, the world's first home banking service, from the Nottingham Building Society and the Bank of Scotland. If you are an investor, Prestel CitiService gives a full financial information service including the latest share and commodity price movements. Prestel also has a travel information and booking service which is widely used throughout the travel industry. Prestel is expanding fast, and new, improved services are constantly being developed.



Keep in touch – you can send electronic mail to any other Micronet 800 or Prestel user.

All this – and even more as the service grows – is available to you through Micronet 800.

And, if you join the service before October 31, we are offering special discounts on the cost of modems and software packs. So don't delay – send the coupon today.

Micronet 800
to a new channel
ts & fun.

Please send me all the information on Micronet 800, the modems and software packs I will need to connect to the service, and a subscriber's application form.

Name________________

Address________________

____

________________**Tel:**____________

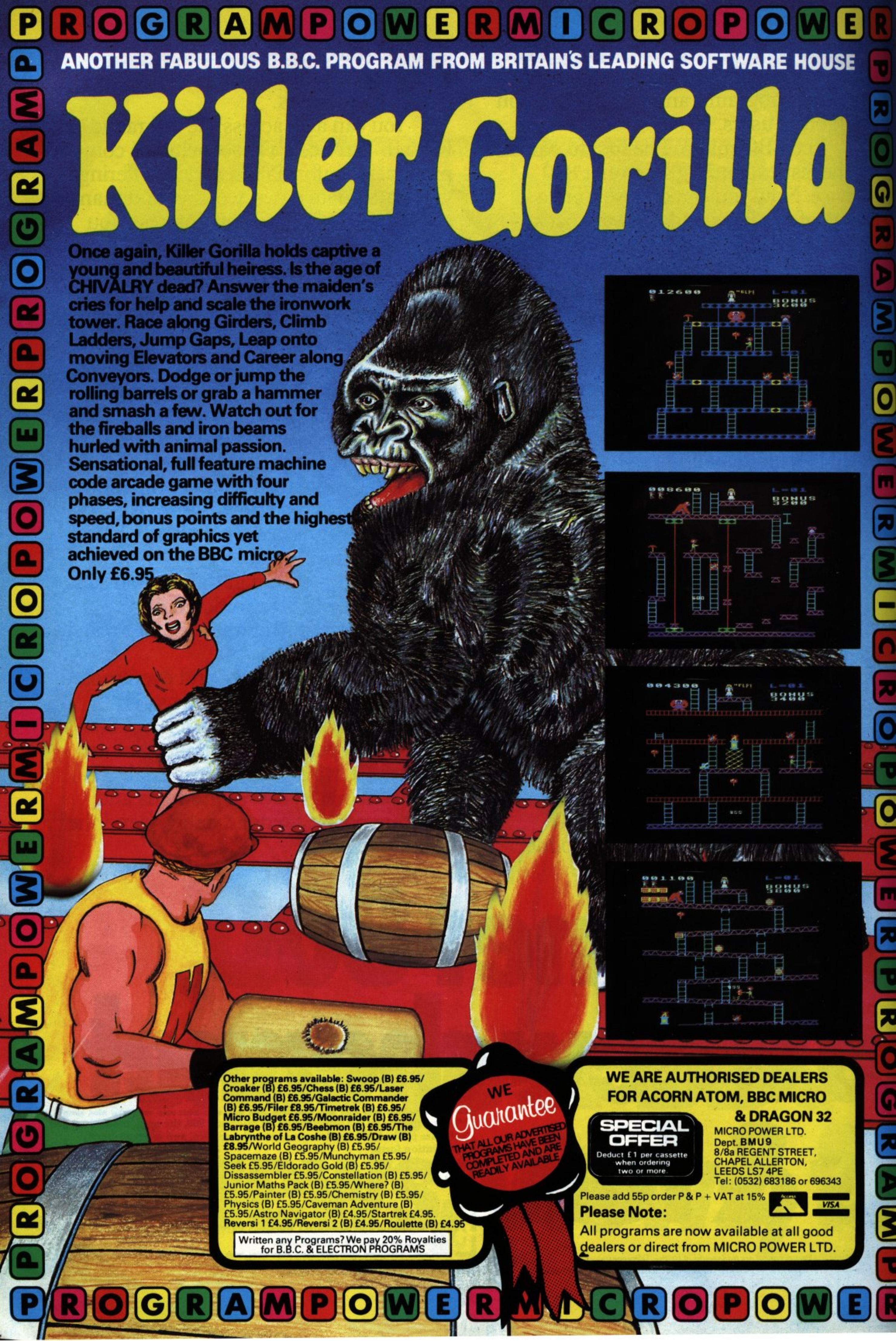
micronet 800

Post to Micronet 800, Scriptor Court, 155 Farringdon Road,
London EC1R 3AD. Tel: 01-278 3143.

BBC

One of the many faces on Prestel.

™Prestel and the Prestel symbol are trademarks of British Telecommunications.
**Subscribers are responsible for quarterly Micronet 800 and Prestel subscription charges.*



ANOTHER FABULOUS B.B.C. PROGRAM FROM BRITAIN'S LEADING SOFTWARE HOUSE

Killer Gorilla

Once again, Killer Gorilla holds captive a young and beautiful heiress. Is the age of CHIVALRY dead? Answer the maiden's cries for help and scale the ironwork tower. Race along Girders, Climb Ladders, Jump Gaps, Leap onto moving Elevators and Career along Conveyors. Dodge or jump the rolling barrels or grab a hammer and smash a few. Watch out for the fireballs and iron beams hurled with animal passion. Sensational, full feature machine code arcade game with four phases, increasing difficulty and speed, bonus points and the highest standard of graphics yet achieved on the BBC micro. Only £6.95

Other programs available: Swoop (B) £6.95/ Croaker (B) £6.95/Chess (B) £6.95/Laser Command (B) £6.95/Galactic Commander (B) £6.95/Filer £8.95/Timetrek (B) £6.95/ Micro Budget £6.95/Moonraider (B) £6.95/ Barrage (B) £6.95/Beebmon (B) £6.95/The Labrynthe of La Coshe (B) £6.95/Draw (B) £8.95/World Geography (B) £5.95/ Spacemaze (B) £5.95/Munchyman £5.95/ Seek £5.95/Eldorado Gold (B) £5.95/ Dissassembler £5.95/Constellation (B) £5.95/ Junior Maths Pack (B) £5.95/Where? (B) £5.95/Painter (B) £5.95/Chemistry (B) £5.95/ Physics (B) £5.95/Caveman Adventure (B) £5.95/Astro Navigator (B) £4.95/Startrek £4.95. **Reversi 1 £4.95/Reversi 2 (B) £4.95/Roulette (B) £4.95**

Written any Programs? We pay 20% Royalties for B.B.C. & ELECTRON PROGRAMS

WE *Guarantee* THAT ALL OUR ADVERTISED PROGRAMS HAVE BEEN COMPLETED AND ARE READILY AVAILABLE

WE ARE AUTHORISED DEALERS FOR ACORN ATOM, BBC MICRO & DRAGON 32

SPECIAL OFFER
Deduct £1 per cassette when ordering two or more.

MICRO POWER LTD.
Dept. **BMU9**
8/8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE
Tel: (0532) 683186 or 696343

Please add 55p order P & P + VAT at 15%

Please Note:

All programs are now available at all good dealers or direct from MICRO POWER LTD.

The long and winding road that leads to Satan's door

Devil's Causeway (Kay Dee Software)

I COULD tell I was on to something different when I saw the packaging that this game came in. It consisted of a very smooth, black plastic case that reminded me more of a video cassette than anything else.

But that was just the wrapping. As my mother always used to say, it's what's inside that counts.

Well I've played Devil's Causeway dozens of times and I can tell you that the game is every bit as well produced as the package it comes in.

The idea is that you have been captured by the Devil and have to make your way to safety by travelling his causeway, a long winding road that you leave at your peril.

In this respect it's just a maze game and a fairly simple one at that. But there are complications.

These come in the form of Satan's Fiendish Friends. (No this is not another dig at Acorn.) As you journey to freedom Old Nick's allies come to test and taunt you by making you play simple but trying games.

Donald the Demon Dice-thrower challenges you to a game of dice. You lose at the risk of your life. Basil the Bomber makes you choose between three boxes, one of which contains a bomb.

Satan has at least half a dozen other allies that I've come across. There might be others but I don't want to meet them!

Devil's Causeway may be a little too simple for the experienced adventurer. But it is great fun both to play, and to watch others playing. Certainly if parents were looking for a game for their children that was fun and also mildly educational then this is the one to go for.

I might also add that if a child were looking for a game that would challenge a parent's abilities while not being too hard for them, the same would apply. With superb packaging enclosing a pleasant, enjoyable game, Devil's Causeway is a program to seriously consider buying.

John Knight

Zany Kong (Solar Soft)

Gorilla crazy!

I DON'T know what it is about gorillas but they do something to people in the micro computing world.

Magazine editors will drop pages of priceless prose (i.e. mine) in order to print something which has a picture of a gorilla.

Beginners go to great trouble learning all about user defined graphics, construct some huge ape, stick it on top of a building and then torment it.

Did no one watch David Attenborough talking to the great apes in the jungle? I know they're not as pretty as Fay Wray but even so they deserve a little better treatment than they're getting in the Second Industrial Revolution!

Anyway, it was nice to come across Solar Soft's Zany Kong, a game where the Gorilla Fights Back. The idea is pretty familiar to most micro users (is there anything new under the sun, I ask?).

Kong is at the top of a series of platforms or scaffolding or whatever, and he has a blonde as his prisoner. (Apes and gentlemen prefer blondes, it seems.)

Our Morris has to rescue her, climbing various ladders and leaping agilely over fireballs, barrels and other nasties. He picks up tools and bonus points on the way and eventually gets a chance at killing Kong. Boo.

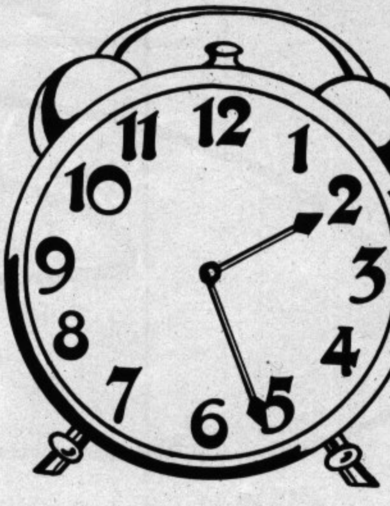
It's hardly the most original game on the market but it's fun and it's nicely done. Pleasant but not anything to ape about.

Nigel Peters

→

Timeman One (Bourne Educational Software)

Time to learn



THIS is an attractively presented package, designed to help children to tell the time and set the clock. Its recommended age range is from four to nine years.

Each of the first six available options uses a colourful screen display which consists of a large clock face, a ladder with a small man positioned half way up it, and a happy face or sad face depending on whether or not the correct answer is entered.

The first three options are telling hours, telling minutes, and telling hours and minutes together. For each of these the child has to enter the appropriate number of hours or minutes, or both together.

If the right answer is given they are rewarded with the appealing "happy face" smiling, and little ladder-man climbing up two rungs on the ladder.

If the wrong answer is given then the "sad face" grimaces, the incorrect time is displayed on the clock and the child is invited to try again.

If another incorrect answer is entered, after displaying the child's entry on the clock the correct answer is shown. Each incorrect entry made causes the ladder-man to climb down one rung of the ladder.

If the stage is completed so that the man reaches the top of the ladder before a total of 15 entries are made, he dances to a tune (the volume is adjustable!) and plants a flag.

This flag is carried over for each individual child to the next stage, so a series of flags can be collected.

For telling hours, the hour hand only is displayed and it points at random to any of the hour numbers on the clock face.

Similarly for telling minutes, the minute hand only is displayed and it points randomly to any number of minutes from 0 to 60 on the clock face.

One of the available menu options is to set the minute intervals to either one or five minutes so that this can be made more challenging for older children.

If the child enters an answer within plus or minus three minutes of the correct time then "CLOSE!" appears on the screen, the ladder-man goes up one step, and the child is invited to try again.

The next three menu options are setting hours, setting minutes and setting both together. In these, the clock is required to be set, by pressing the H and M keys.

The response for a correct or incorrect entry is the same as for the first three options except that for incorrect responses the child is told what time he set the clock to, and then invited to have another go.

For setting both hours and minutes, moving the minute hand causes the hour hand to be correctly positioned relative to the hour marks, to give a more accurate representation.

The minute intervals can be set as before to one or five minute accuracy.

The seventh menu option is the BES monitoring system, which holds detailed information on the responses of the last six users of the program.

This lets the teacher or parent access each record and see each child's name, how much time he took, which options were attempted and the responses to each question.

These are shown with the time settings asked in white, correct entries made in green and incorrect entries in red. It also shows whether one or five minute intervals were chosen and whether hours or minutes or both were being tested.

This comprehensive monitoring system is a particularly valuable feature of the package. It enables the teacher or parent to evaluate each child's particular difficulties or achievements.

This is an entertaining and highly instructive program which has been thoughtfully designed to appeal to children and to be as useful as possible for guided learning either at home or in the classroom.

Jane Jackson

Action of the Heart (Garland Educatio

Finger nurse

THERE's been a lot of talk in nursing circles recently about the use of computer assisted learning in nurse education centres.

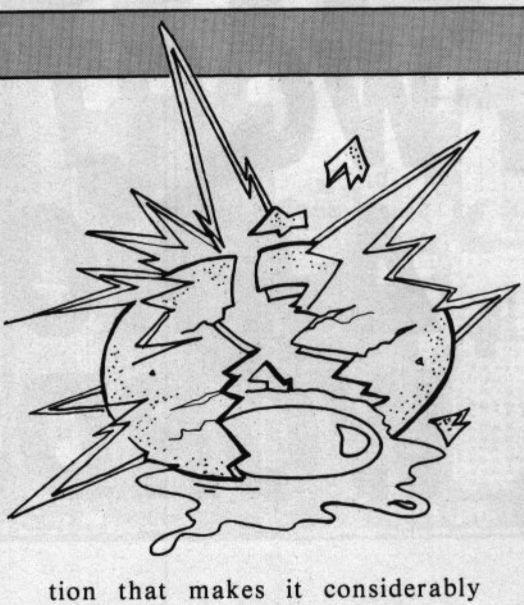
A lot of talk but, as is usual in anything that might mean change to the nursing profession, very little action.

Given this, it was nice to come across a series of programs that, although designed with schoolkids in mind, is good enough to use in training the Florence Nightingales of the '80s.

Garland Software has published a suite of educational programs with the emphasis on basic human anatomy and physiology. They cover areas such as the heart, the function of the kidneys

Swoop (Program Power)

Bombing birdman



THEY say that you can't teach an old dog new tricks. But after playing Swoop I've realised that you can certainly produce a new game from an old arcade favourite.

If you remember Galaxians then you've got the basic idea of Swoop. It's one of the Space Invader generation of games where waves of hostiles peel off and dive-bomb you as you try to survive using your defensive laser for protection.

In this incarnation the scenario is that you are being attacked by homing, swooping birdmen who you naturally try to avoid.

Incidentally I dread to think what it is that they're dropping on your head!

This particular game has an innovation that makes it considerably different – and a lot more fun to play. If a birdman reaches the ground it lays an explosive egg for you to run into and destroy yourself. Sweet aren't they?

The eggs disappear after you've managed to hit enough of the harpies but there are always more where they came from.

It's a really enjoyable version of an old favourite, enhanced by good graphics, nice sound effects and easily used controls.

With eight levels of difficulty consisting of more bombs, more swooping birdmen and even more durable eggs Swoop is everything a good action game should be. A winner.

Eileen Young

Hopper (Acornsoft)

Froggy fun from old favourite

ALRIGHT, so Hopper isn't the most original game that you're going to buy. But it is fun, and Acornsoft have produced a colourful, lively version of an old favourite.

In the unlikely event that you don't know or can't guess what it's about I'll explain. The idea is that you have to hop your frog across a road avoiding vehicular traffic (as the Highway Code would put it).

Having missed being squashed to death you then have to cross a stream by means of logs and the backs of sometimes treachorous turtles to reach one of five "froggy lairs". You mustn't fall in the water as apparently these frogs can't swim.

As you might guess the whole thing gets more difficult with snakes and crocodiles joining in the mayhem. And if that's not enough you have to beat the clock as well.

It's great fun and Acornsoft with their usual skill and inside knowledge have produced yet another excellent version of an old arcade favourite.

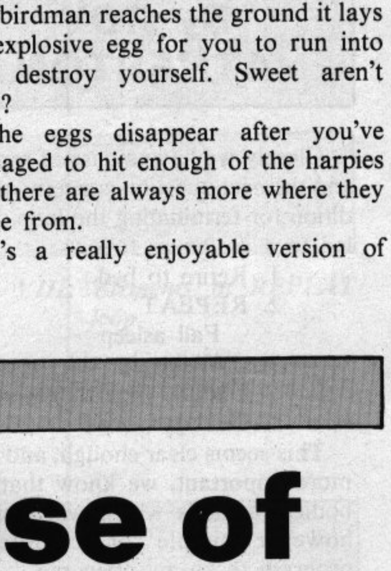
Sadly the only thing missing is the good old lady frog. Has Mrs Whitehouse invaded the micro world?

That thought cast the only shadow on the game. Highly recommended.

Trevor Roberts

oftware)

on the pulse of training?



and the female reproductive cycle.

Each program is produced to a high standard, with a full set of printed notes as teacher aids and a fairly realistic attitude to how they are going to be used.

Taking the "Action of the Heart" as an example, what we get for our money is a well thought out introduction to the structure and functions of the heart, along with a series of questions to test our understanding.

It then goes on to the actual dynamics of the organ, and the whole thing is rounded off with a schematic model of the heart in action.

The graphics are excellent and the whole package is an example of what well structured, useful educational software should be. Nurse educators and secondary school teachers should look at these closely.

Pete Bibby

PICTURES WORTH A THOUSAND WORDS...

By ROY ATHERTON

"I want to reach that state of condensation of sensations which constitutes a picture." Note du Peintre – Henri Matisse, 1908.

THE computer pioneers used flowcharts to help them to design, debug and update programs. Such flowcharts might become part of the documentation of a program and help to describe its function. Teachers also use them as an obvious learning aid. Consider the example in Figure I.

Such a flowchart, or its more complex developments, might have three functions. These are: a tool of analysis and design, a description and a learning aid.

The corresponding word-design might be as follows:

```
1. Retire to bed.
2. Fall asleep.
3. Wake up.
4. If NOT time to get
   up THEN GOTO 2
5. Get up.
```

In passing, one might observe the twisting of the logic from asking in the flowchart "Is it time to get up?" to "IF NOT time to get up THEN" in the program design. The price of preserving the logic would be an extra GOTO statement.

But the main observation must be that in a structured approach we do not focus directly on flow of control. All we need to know is what structure is involved and what is its relationship with other elements of the program.

These are not difficult questions because there are only three necessary relationships between them. What, then, is the structured approach?

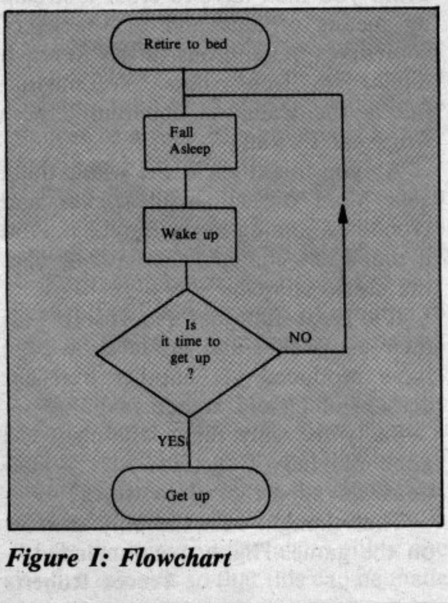


Figure I: Flowchart

Clearly we have a case of repetition, and the next question concerns the condition for terminating the loop. We are led to a design as follows:

```
1. Retire to bed.
2. REPEAT
      Fall asleep
      Wake up
   UNTIL time to get up
3. Get up.
```

This seems clear enough, and what is more important, we know that it embodies methods which will work well however simple or complex our program tasks may become.

If this type of word-analysis and design is better than flowcharting, which goes with the use of GOTO statements, do we need any kind of pictorial representation?

The answer seems to be a matter of personal taste, complicated by the fact that people have three possible reasons for using pictorial representation of algorithms.

There are three methods for representing graphically a structured algorithm or program, and they are discussed in "Structured Programming with Comal" (Ellis Horwood, 1982). The preference among teachers seems to be for structure diagrams.

A structure diagram reflects the three possible relationships between elements of a program: sequence, control, modularity.

The program design given earlier has three elements in sequence at the first level. We represent this by placing boxes horizontally and we move left to right.

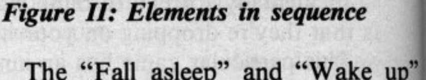


Figure II: Elements in sequence

The "Fall asleep" and "Wake up" elements are controlled by the REPEAT structure and we indicate this by placing them below the REPEAT UNTIL box.

The lines joining these statements to the controlling structure indicate this relationship, not flow of control.

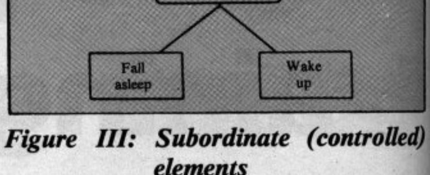


Figure III: Subordinate (controlled) elements

A similar arrangement applies to decision structures with a different shaped box.

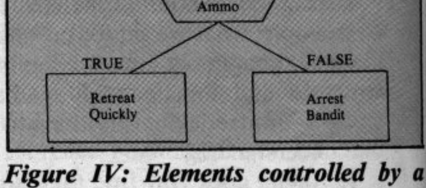
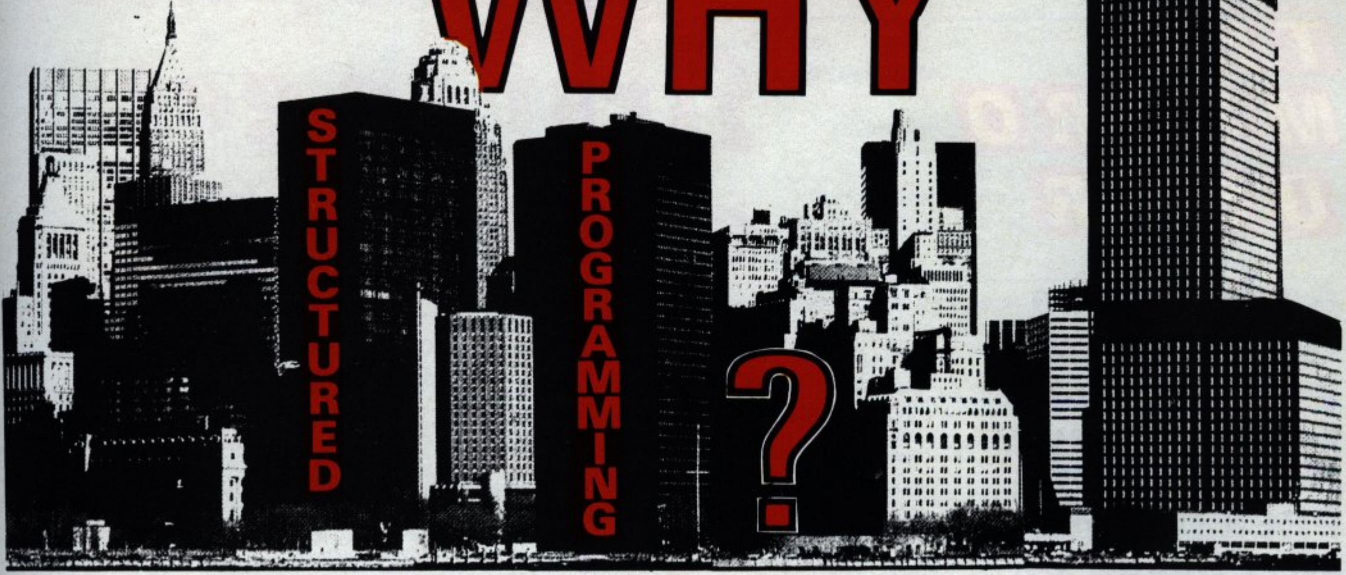


Figure IV: Elements controlled by a decision

A procedure definition is indicated by a double-lined box and drawn

PART 5

WHY STRUCTURED PROGRAMMING?



separately. The lines indicate that the elements belong to the procedure. The double-lined box is also used for a procedure call.

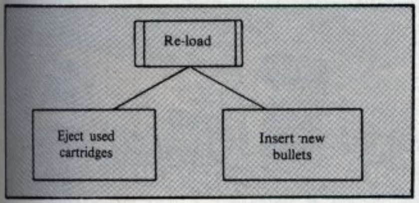

Re-load
Eject used cartridges
Insert new bullets

Figure V: Procedure definition

The elements of a main program obviously belong to it and are connected to a title box. If we start with this and look again at the program which we will call "SLEEP" we can see the relationship between program and structure diagram.

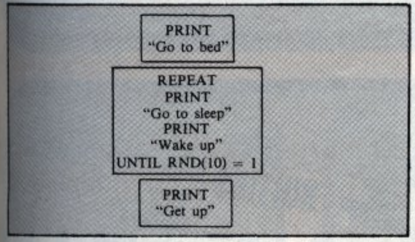

PRINT
"Go to bed"
REPEAT
PRINT
"Go to sleep"
PRINT
"Wake up"
UNTIL RND(10) = 1
PRINT
"Get up"

Figure VI: Program SLEEP

There are three main elements, so we place these boxes under the title box.

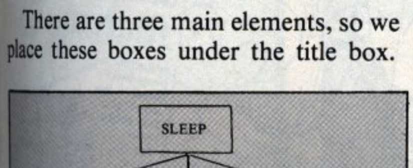

SLEEP
PRINT "Go to bed"
REPEAT UNTIL RND(10) = 1
PRINT "Get up"

Figure VII: Outline of program SLEEP

Now we examine any structure boxes. There is only one and we ask, "What is its content?" There are two elements in the repeat loop in the program.

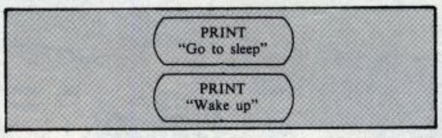

PRINT "Go to sleep"
PRINT "Wake up"

Figure VIII: Elements in REPEAT loop

These are placed under the structure box, to complete this simple example. The method holds for more complex programs.

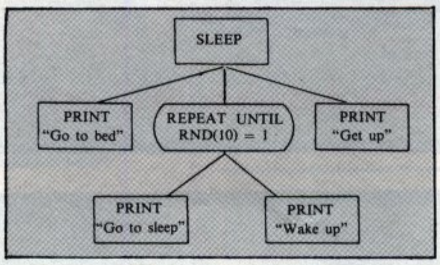

SLEEP
PRINT "Go to bed"
REPEAT UNTIL RND(10) = 1
PRINT "Get up"
PRINT "Go to sleep"
PRINT "Wake up"

Figure IX: Final Structure Diagram

Some readers may feel that the more useful process is that which takes us from a structure diagram to a program.

This is equally simple. We perform what is sometimes called a "Natural Walk" around the structure diagram.

Imagine you are an insect crawling around the diagram. Start at the title and regard the lines as walls, always keeping them on your left.

Each time a rectangular box is encountered, write down a program statement. Open a structure when you pass its box on the way down and close it on the way up.

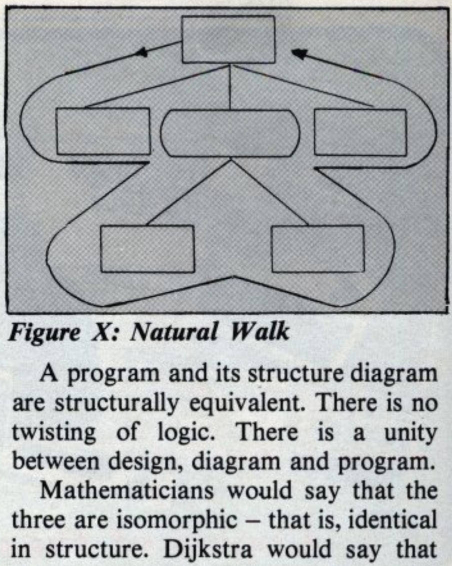


Figure X: Natural Walk

A program and its structure diagram are structurally equivalent. There is no twisting of logic. There is a unity between design, diagram and program.

Mathematicians would say that the three are isomorphic – that is, identical in structure. Dijkstra would say that the conceptual gap between the (static) design, diagram or program and the (dynamic) execution of the program has been reduced to the minimum.

Even so, many good programmers find the structures themselves perfectly adequate. Beginners have written quite good programs of hundreds of lines after only a few weeks experience without using structure diagrams.

Others find them helpful, and some teachers believe that they have considerable value for learning.

A structure diagram exhibits relations within a main program or procedure. It does not give a proper overview of a large program with many procedures. Structure charts do that, but they are beyond the scope of this article.

- *To be continued*

THE MICRO USER

Be one of the first to get each issue!

A subscription will ensure you get your own personal copy HOT OFF THE PRESSES month after month for the next year.

Every owner of a BBC Micro – and everyone thinking of buying one – needs to get Micro User every month. It's the biggest, brightest, most authoritative yet completely independent guide to a machine that has so much potential you will never tire of reading about its remarkable capabilities.

You can buy Micro User from your local newsagent or station bookstall. Or you can take out a 12 months subscription and have it delivered by post.

BBC MICRO USER
BBC MICRO USER
KILL KONG!
BBC MICRO USER
WIN a Cumana disc drive
JUMPIN' KANGAROOS!
THE MICRO USER
WIN
THE MICRO USER
WIN
THE MICRO USER
WIN
TALKING TURTLES

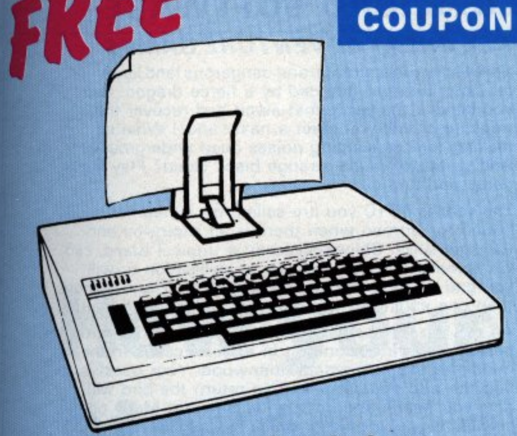
Copies of these back issues are still available at £1.25

BBC MICRO USER
Deathwatch
and 24 other programs listed in the pages of BBC Micro User Vol. 1, No. 1.
BBC MICRO USER
KING KONG
and 22 other programs listed in the pages of BBC Micro User Vol. 1 No. 2
BBC MICRO USER
AIR STRIKE!
32K
and 33 other programs listed in the pages of BBC Micro User Vol. 1, No. 3
BBC MICRO USER
SPACE PILOT
and other programs listed in the pages of BBC Micro User Vol. 1, No. 4.
THE MICRO USER
TENPINS
and other programs listed in the pages of The Micro User Vol. 1, No. 5.
THE MICRO USER
FRUITIES
and other programs listed in the pages of The Micro User Vol. 1, No. 6
THE MICRO USER
Robin and Marian
and other programs listed in the pages of The Micro User Vol. 1, No. 7

Cassette tapes of Micro User programs – £3.75

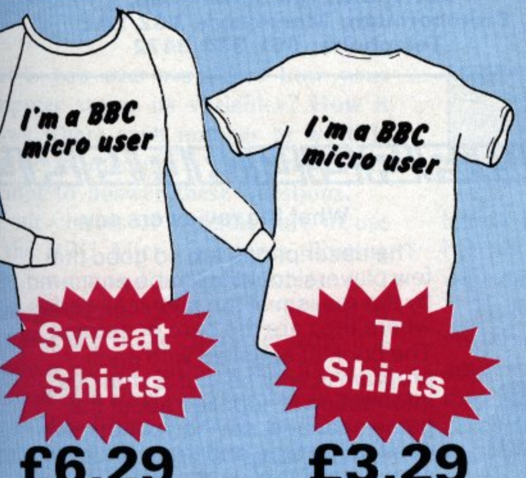
Or take out a year's subscription and have your cassette posted to you each month.
You can start your subscription from any issue to take advantage of this offer.

FREE



If you take out a subscription to Micro User you will receive completely free the sturdy copy-holder illustrated above, together with a large crib card containing essential information and charts that will save you continually referring to the User Guide. This free gift is for a limited period, so subscribe now!

COMPLETE THIS COUPON TODAY


I'm a BBC micro user
I'm a BBC micro user
Sweat Shirts
T Shirts

£6.29 **£3.29**

Blue printing on either light blue or white backgrounds

Keep your collection of Micro User complete with these handsome binders

£3.95 (UK)

Your BBC Micro needs protecting!

£3.25 Standard (beige)

£3.95 Deluxe (clear)

ORDER FORM

All prices include postage, packing and VAT, and are valid to 30 September 1983.

Please enter number required in box — £ p

Micro User annual subscription

UK £12 ☐
EIRE £13 ☐
EUROPE £18 ☐
Surface mail – USA £15 ☐
Air mail – USA £25 ☐
Surface mail – Rest of world £15 ☐
Air mail – Rest of world £30 ☐

Commence with .... issue TOTAL ....

Micro User back issues

☐ £1.25 UK
Rest of world:
☐ £1.50 – Surface
£2.50 – Air mail

March 1983 ☐
April 1983 ☐
May 1983 ☐
June 1983 ☐
July 1983 ☐
Aug 1983 ☐

TOTAL ....

Cassette tape annual subscription

£40 (UK & Overseas) ☐

Commence with .... tape (state month) TOTAL ....

Cassette tape single copies

£3.75

(UK & Overseas)

Deathwatch March 1983 ☐
King Kong April 1983 ☐
Air Strike May 1983 ☐
Space Pilot June 1983 ☐
Tenpin July 1983 ☐
Fruities Aug 1983 ☐
Robin & Marian Sept 1983 ☐

TOTAL ....

Dust Covers

£3.25 – Standard
£3.95 – Deluxe ☐
(UK & Overseas)

TOTAL ....

Binders

£3.95 – UK
£5.00 – Overseas ☐

TOTAL ....

T-Shirts £3.29 (UK & Overseas)
Sweat Shirts £6.29 (UK & Overseas)

		T-Shirt		Sweat Shirt	
		Blue	White	Blue	White
Age 6-8	28″				
Age 10-12	30″-32″				
Small	34″-36″				
Medium	36″-38″				
Large	38″-40″				
Extra Large	40″-42″				

TOTAL ....

Payment: please indicate method (✓) **TOTAL**

☐ Access/Mastercharge/Eurocard
☐ Barclaycard/Visa
☐ American Express

Card No. ____________
Expiry Date ____________

☐ Cheque/PO made payable to Database Publications Ltd.

Name ____________
Address ____________
____
Signed ____________

Send to: Micro User, FREEPOST, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.
(No stamp needed if posted in UK)

Or you can order by phone quoting credit card number and expiry date. **061-456 8383** *9am - 5pm*
061-456 4157 (subscriptions/back numbers)

BBC FORTH £15

"For your money you get not only a very good implementation of the popular FORTH language but also a 72 page manual ...Once you have got an idea of the fundamentals you should get better value out of this pack than virtually any other program you could buy. In fact, the only reason I can think of for not buying this cassette is that you already have a version of FORTH!" - *LASERBUG April 83*

"rqFORTH is fast and has a first-class screen editor . . . Overall, a good buy" - *Computing Today July 83*

rqFORTH costs just £15 (inclusive) and runs on 16K or 32K BBC micros. It:

- ★ needs no added hardware and works with any MOS version;
- ★ works with cassette and disc;
- ★ is FORTH-79 STANDARD and has fig-FORTH facilities;
- ★ provides 260 FORTH words and is infinitely extensible;
- ★ allows full use of the MOS via *MOS, CALL and EMIT;
- ★ permits use of all graphic modes, even 0-2 (just!);
- ★ has an excellent full-screen editor;
- ★ runs faster than BBC BASIC;
- ★ includes a 72 page manual, a 20 page disc supplement and a summary card for quick reference;
- ★ is used by hundreds of people, worldwide.

BBC FORTH TOOLKIT £10

"Level 9 promise to support rqFORTH and this pack proves it. It provides the source code for all sorts of useful routines and examples of how to program in FORTH. With so much on one cassette it would be good value at twice the price." - *LASERBUG April 83*

The rqFORTH toolkit costs just £10 (inclusive) and adds the following facilities to FORTH:

- ★ a full assembler, providing machine-code within FORTH;
- ★ turtle graphics, giving you easy-to-use colour graphics;
- ★ decompiler routines, allowing the versatile examination of your compiled FORTH programs;
- ★ the full double-number set (with many extensions);
- ★ an example FORTH program and demonstrations of graphics;
- ★ other useful routines.

ALL PRICES INCLUDE P&P AND VAT. ALL programs are in stock and orders will be sent within 2 days of receipt. Please send order or SAE for catalogue, describing your micro, to:

LEVEL 9 COMPUTING

Dept U 229 Hughenden Road, High Wycombe, Bucks HP13 5PG

MP

B.B.C. MICRO SOFTWARE

THREE GREAT ADVENTURE GAMES

***NEW* BLUE DRAGON** Somewhere in a strange and dangerous land lies a fabulous treasure guarded by a fierce dragon. Can you survive the perils that await and recover the treasure or will you meet a nasty end!! What is making terrible slurping noises deep underground? And what use is the strange black cloud? Play the game and find out.

"SURVIVOR" The year is 1910 you are sailing on a steamer bound for Borneo when there is an explosion and the ship sinks. Shipwrecked on a tropical island, can you survive and escape back to civilisation or will you end up in someones cooking pot!! There is more than one ending to this game, not all of them bad!

"FIRIENWOOD" An evil wizard has captured the magic golden bird of paradise and imprisoned it in a weird castle in the middle of the enchanted Firienwood. Your quest is to find the bird and set it free, in return the bird will give you health and prosperity. Beware! Many perils lie before you and every move is fraught with danger!!

Each game is priced at £7.48 on cassette or £10.50 on disc.

All the games are text only and written in machine code for high speed. They require 32K and run on all operating systems. Prices include VAT and Postage within UK. Send SAE for full range of programs and price list or ask your local dealer.

Trade enquiries welcome.

ALL PRICES INCLUDE POSTAGE. CHEQUES AND POSTAL ORDERS PAYABLE TO: M.P. SOFTWARE.

MP

SOFTWARE & SERVICES

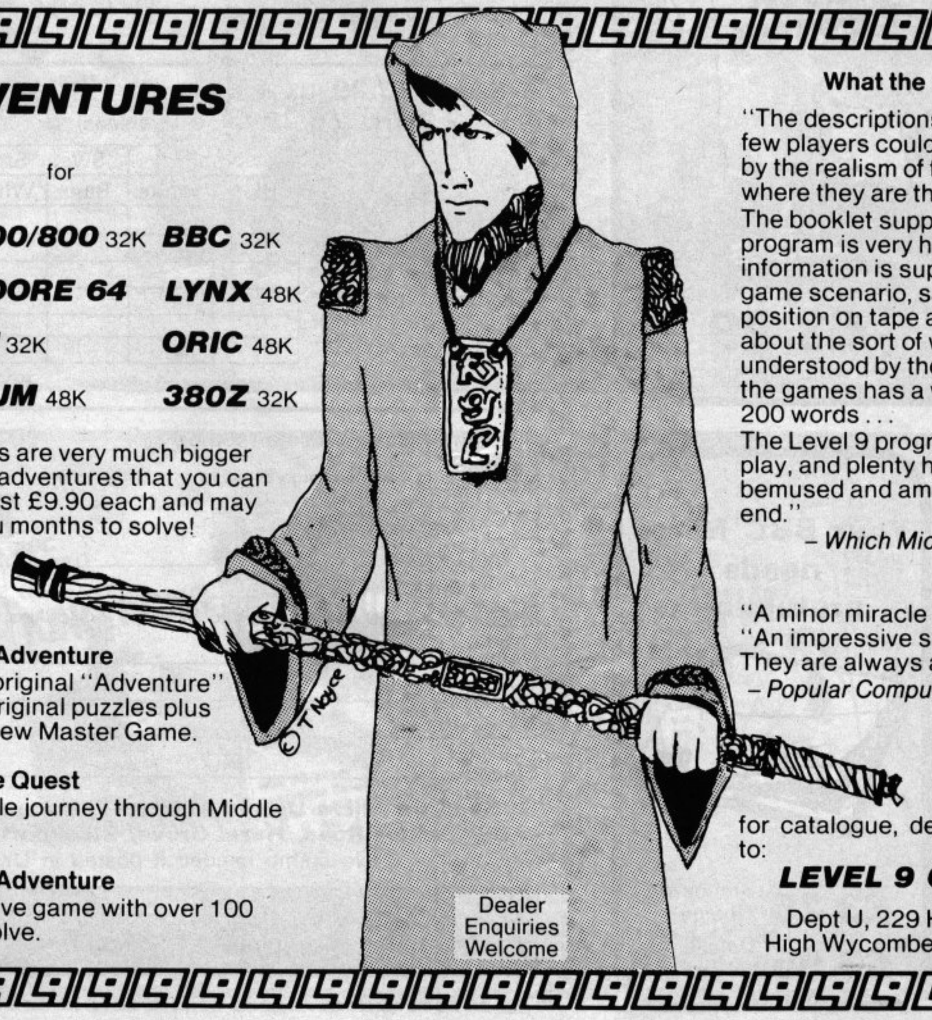
DEPT. BM, 165 Spital Road,
Bromborough, Merseyside L62 2AE.
Telephone: 051-334 3472

ADVENTURES

for

ATARI 400/800 32K ***BBC*** 32K
COMMODORE 64 ***LYNX*** 48K
NASCOM 32K ***ORIC*** 48K
SPECTRUM 48K ***380Z*** 32K

These games are very much bigger than normal adventures that you can buy. They cost £9.90 each and may well take you months to solve!



1) Colossal Adventure
The classic original "Adventure" with all the original puzzles plus a complete new Master Game.

2) Adventure Quest
An epic puzzle journey through Middle Earth.

3) Dungeon Adventure
A truly massive game with over 100 puzzles to solve.

Dealer Enquiries Welcome

What the reviewers say

"The descriptions are so good that few players could fail to be ensnared by the realism of the mythical worlds where they are the hero or heroine . . . The booklet supplied with each program is very helpful. Extensive information is supplied about the game scenario, saving your current position on tape and there are hints about the sort of words which are understood by the computer. Each of the games has a vocabulary of about 200 words . . .
The Level 9 programs are great fun to play, and plenty happens to keep you bemused and amused for hours on end."

– *Which Micro & Software Review, August*

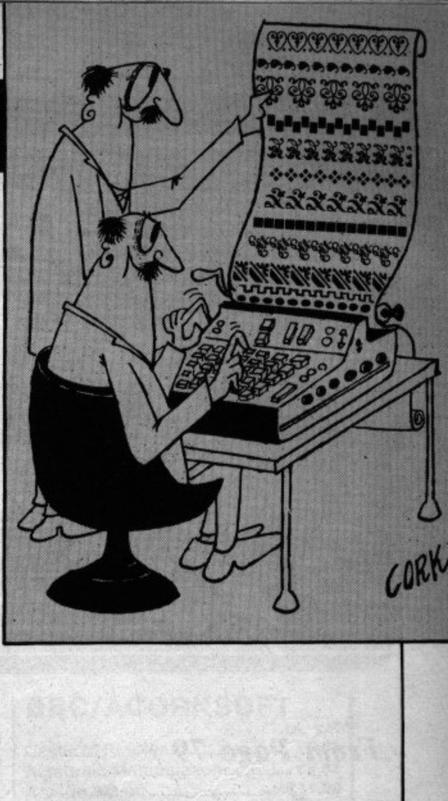
"A minor miracle of programming",
"An impressive suite of adventures. They are always a pleasure to play"

– *Popular Computing Weekly, 12 May & 23 June*

Send order, or SAE for catalogue, describing your micro, to:

LEVEL 9 COMPUTING

Dept U, 229 Hughenden Road
High Wycombe, Bucks HP13 5PG



How your micro stores – and preserves those.. VARIABLES

By JOHN LORD

HAVE you ever wondered how your computer stores its variables? How it knows where each number or word is located in memory? This article will attempt to answer these questions.

Four classes of variables are in use on the BBC Micro – integer, floating point, string and array variables.

Integer variables end in a '%' sign. If the name is a single character letter it is a system integer variable and its value is stored as a four byte number in page 4 – that is from &400 to &4FF.

The value of @% is located in the four bytes starting at &400, A% at &404, B% at &408 and so on to Z% at &468.

All other variables are stored together after the end of the Basic program. Separate regions are not allocated to the different types of variable. They are stored in the order they are encountered in the program.

The memory from &482 is used to keep a catalogue of where the variables are stored in the computer's memory.

For example:

&482 points to the location of the first variable beginning with A,

&484 points to the address of the first variable starting with a B,

&4C2,3 points to the address of the variable starting with a,

&4F4,5 points to the address of the variable starting with z

In addition to variables starting with letters they may begin with '£' or '_' but not @. @% is used to control the way data is printed.

To find out more about the way the variables are stored examine the addresses indicated by the variables map. The program "Memory Display," described in the July issue of *Micro User,* displays 128 bytes, 8 bytes to a line, when the starting point M is defined. I suggest you use this to examine the way variables are stored.

Now type M=&400 press Return, f1 and Return. You should see displayed the contents of memory locations from &400 to &47F.

The first four locations contain 4000. Then follows a page of 0s if you have OS 1.0 or above. If you have OS 0.1 there should be 60 bytes with FF before the page is completed with 0s. This page is where the system integer variables are stored.

The 4000 is the hexadecimal value of @% stored LSB (least significant byte) to MSB (most significant byte). Each byte has two figures, if there is only one as in 4 it is really 04, so @%=&00000004 or &4 for short.

If this half page contains anything else then you will have to clear the contents of these locations. Typing CLEAR and pressing Return does not clear the system integer variables, though it does clear the variable map. Neither a "soft" nor a "hard" break alters the system integer variables.

Switching the computer off clears all variables and also all the RAM, including your program. The following routine programmed into key f0 will clear the system variables.

```
*KEY0 CL.:?&4FF=&0D:M%=&480:A$=$M%:M%=
      &400:$M=A$:CL.|M
```

```
              <CLEAR>
```

fills the half page from &480 full of zeroes.

```
      M%=&480:A$=$M%:M%=&400:$M=A$
```

fills half a page of the system integer variables with zeroes.

```
              <CLEAR>
```

is needed because the routine has used M and A$.

If you have O.S. 1.0 or later you could call it in a program via

```
            *FX 138.0.128
```

which puts 128 into the keyboard buffer and makes the computer think that f0 has been pressed.

You cannot put this routine into a procedure because CLEAR deletes the reference to the procedure and so when

→

From Page 79

ENDPROC is reached the error handling routine reports 'No PROC'.

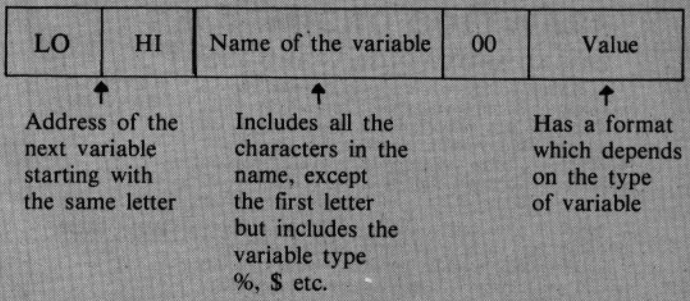
To see how the computer stores its variables initialise them with the following program:

```
 10 LOMEM=&1000
 20 A%=&6543:B%=&483620
 30 Z%=-&3456:a%=&4923
 40 £%=&1234:ZAD%=&3482
 50 A=&3489:B=27.6
 60 Z=489.7:_stu=25.63
 70 adr=1.25:fred=6400
 80 z=25.375:ABC$="abcdef"
 90 Bcde$="efghijklm":Cab$="aaaaaaaa"
100 DIM A%(5)
110 A%(1)=&4519:A%(2)=&1529
120 A%(3)=&2915:A%(4)=&1295
130 A%(5)=&152
```

Now run the program. Type M=&400 press Return, f1 and Return and see how the values of the system variables have changed.

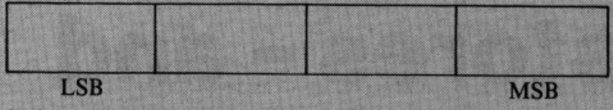
```
400   4   0   0   0  43  65   0   0 @%=&4, A%=&6543
408  20  36  48   0   0   0   0   0 B%=&483620
410   0   0   0   0   0   0   0   0
418   0   0   0   0   0   0   0   0
420   0   0   0   0   0   0   0   0
428   0   0   0   0   0   0   0   0
430   0   0   0   0   0   0   0   0
438   0   0   0   0   0   0   0   0
440   0   0   0   0   0   0   0   0
448   0   0   0   0   0   0   0   0
450   0   0   0   0   0   0   0   0
458   0   0   0   0   0   0   0   0
460   0   0   0   0   0   0   0   0
468  AA  CB  FF  FF   0   0   0   0
Z% stored as 2's complement of &3456
470   0   0   0   0   0   0   0   0
478   0   0   0   0   0   0   0   0
```

VARIABLE STORAGE FORMAT

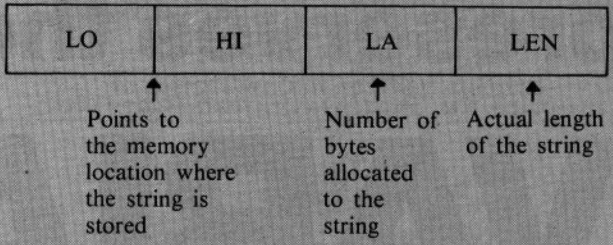

LO
HI
Name of the variable
00
Value
Address of the next variable starting with the same letter
Includes all the characters in the name, except the first letter but includes the variable type %, $ etc.
Has a format which depends on the type of variable

VALUE FORMAT

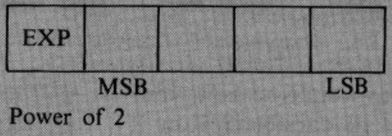
Integer (4 bytes long)



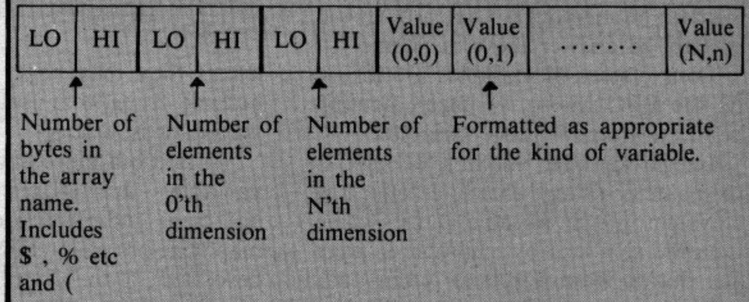
String


LO
HI
LA
LEN
Points to the memory location where the string is stored
Number of bytes allocated to the string
Actual length of the string

FLOATING POINT (5 bytes long)


EXP
MSB
LSB
Power of 2

ARRAYS


LO
HI
LO
HI
LO
HI
Value (0,0)
Value (0,1)
....
Value (N,n)
Number of bytes in the array name. Includes $, % etc and (
Number of elements in the 0'th dimension
Number of elements in the N'th dimension
Formatted as appropriate for the kind of variable.

VARIABLE MAP

```
480   0   0  1A  10  22  10  86  10    A is stored at &101A
488   0   0   0   0   0   0   0   0    B is stored at &1022
490   0   0  C9  10   0   0   0   0    Cab$ is stored at &1086
498   0   0  C1  10   0   0   0   0    I is stored at &10C9
4A0   0   0   0   0   0   0   0   0    M is stored at &10C1
4A8   0   0   0   0   0   0   0   0    ZAD% is stored at &1010
4B0   0   0   0   0  10  10   0   0    _stu is stored at &1032
4B8   0   0   0   0   0   0  32  10    £% is stored at &1008
4C0  08  10   0  10   0   0   0   0    a% is stored at &1000
4C8   0   0   0   0  47  10   0   0    fred is stored at &1047
4D0   0   0   0   0   0   0   0   0    z is stored at &1052
4D8   0   0   0   0   0   0   0   0
4E0   0   0   0   0   0   0   0   0
4E8   0   0   0   0   0   0   0   0
4F0   0   0   0   0  52  10   0   0
4F8   0   0   0   0   0   0   0   0
```

QUICKSHOT JOYSTICK
Self centering type, works even with keyboard only programs.
Runaway success at the BBC Micro User Show.
ONLY £19.95 + £1.00 p&p

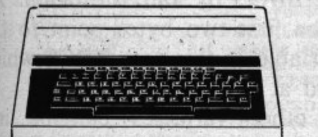
Computerama- The Midlands Home Computer Specialists

SYSTEMS FOR EDUCATION BUSINESS & LEISURE
ACORN COMPUTER DEALER
SAME DAY DESPATCH ON STOCK ITEMS
TELEPHONE FOR LATEST PRICE CHANGES

EASY TABS DEALER

BBC

	Inc. VAT
Acorn Electron	T.B.A.
BBC Model B	£399.00
BBC Model B + Disc/Int	£469.00
BBC Disc Interface	£89.00
BBC A/B Full Upgrade	£69.00
BBC Teletext Receiver	£225.00
BBC 6502 2nd Processor	£299.00
BBC Z80 2nd Processor	£289.00



BBC DISC DRIVES

	Inc. VAT
Acorn/LVL single 100K drive (expands to Double)	£265.00
Acorn/LVL dual 100K	£389.00
Pace single 100K drive	£212.75
Pace dual 100K drive	£388.00
Pace dual 40/80 track switchable double sided drive 800K	£699.00
single version of above	£368.00
Torch dual 400k Z80 + 64K disc pack	£895.00
Hitachi 3" Micro-Drive 100K	£225.00

MONITORS

	Inc. VAT
Microvitec 14" colour	£287.00
Sanyo 14" colour	£284.95
Sanyo 12" green monitor	£89.00
ITT 14" TV/Colour Monitor	£289.50

ACCESSORIES

	Inc. VAT
Cassette Deck BBC compatible	£27.95
Cassette Leads – all types	£2.80
BBC Joysticks	£13.00
Printer Cable (Parallel)	£10.00
BBC Dust Cover	£5.95
Light Pen	£28.75
Data Cassettes C15/C20	50p/65p

PRINTERS

	Inc. VAT
Shinwa CP80	£329.00
Star DP510	£329.00
Seikosha GP100A	£219.00
Epson RX80	£349.00
Epson FX80	£459.00
NEC PC8023	£368.00
Smiths Corona TPI/E	£439.00
Juki 6100 Daisywheel	£459.00

BOOKS

	Inc. VAT
30 Hour Basic	£5.95
A.L.P. for BBC Micro	£8.95
BBC Revealed	£7.95
Let your BBC Micro teach you to program	£6.95
Basic Programming on the BBC Micro	£5.95
Creative Graphics	£7.50
Graphs & Charts	£7.50
Lisp Manual	£7.50
Forth Manual	£7.50
35 Educational Programs for the BBC	£6.95
30 Progs BBC	£4.95
Further Programming for the BBC Micro	£5.95
Programming the BBC	£6.95
Using Floppy Discs with the BBC	£10.00
6502 M/C for Beginners	£5.95
Programming 6502 (Sybex)	£10.75

A&F SOFTWARE

	Inc. VAT
Painter	£8.00
Planes	£8.00
Frogger	£8.00
Lunar Lander	£6.95
Pharoahs Tomb	£8.00
Tower of Alos	£6.95

APPLICATIONS

	Inc. VAT
Wordwise ROM	£44.85
Beebcalc ROM	£39.00
Disc Doctor ROM	£21.85
Debugging Program ROM	£21.85
Pace DFS	£34.45

PROGRAM OF THE MONTH
Space Highway
£6.95
Each month we recommend a superb new game.

CLARES

	Inc. VAT
Graphkey	£7.95
Replica (disc only)	£9.95
Graph Disc	£12.95
Beebsynth	£7.95
The Key (disc only)	£12.95

TORCH HAVE THE PERFECT ANSWER

With every Torch Z80 Disc Pac you receive:

- Perfect Writer
- Perfect Speller
- Perfect Filer
- Perfect Calc

FREE SOFTWARE Value over £1000

ONLY £895.00

I.J.K. SOFTWARE

	Inc. VAT
Atlantis	£7.50
Leapfrog	£7.50
Hyperdrive	£6.50
Invaders 'B'	£7.50
Mutant/Breakout	£6.50
Strato Bomber	£7.50

PROGRAM POWER

	Inc. VAT
Asteroid Storm	£7.95
Barrage	£7.95
Chess Model B	£7.95
Cowboy Shoot Out	£6.85
Croaker	£7.95
Danger UXB	£7.95
Eldorado Gold	£6.85
Escape From Moonbase Alpha	£7.95
Galactic Commander	£7.95
Hell Driver	£7.95
Junior Maths	£6.85
Killer Gorilla	£7.95
Laser Command	£7.95
Seek	£6.85
Swoop	£7.95
Time Trek	£7.99
World Geography	£6.85
Where	£6.85

BUG BYTE

	Inc. VAT
Dragon Quest	£11.50
Golf	£5.50
Polaris	£5.50
Space Warp	£9.00
Music Synth	£9.50
Galaxy Wars	£7.50
Sea Lord	P.O.A.
City Defence	£7.50
Oblivion	£7.50

BBC/ACORNSOFT

	Inc. VAT
Castle of Riddles	£9.95
Algebraic Manipulation	£9.95
Arcade Action	£11.90
Arcadians	£9.95
Business Games	£9.95
Chess	£9.95
Creative Graphics	£9.95
Countdown to Doom	£9.95
Cube Master	£9.95
Desk Diary	£9.95
Forth	£16.85
Graphs & Charts	£9.95
Lisp	£16.85
Missile Base	£9.95
Meteors	£9.95
Monsters	£9.95
Peeko Computer	£9.95
Philosophers Quest	£9.95
Planetoid	£9.95
Rocket Raid	£9.95
Sliding Block Puzzles	£9.95
Snooker	£9.95
Sphinx Adventure	£9.95
Starship Command	£9.95
Super Invaders	£9.95
Tree of Knowledge	£9.95
Snooker	£9.95
View	£59.00

MAIL ORDER

Post your order today to: **Computerama, 1 Sash Street, Stafford ST16 2PS.** Or telephone your Access or Barclaycard number, we will despatch immediately **(0785) 41899.** Call in today. See the Midlands Home Computer Centre for the BBC enthusiast.
Send large S.A.E. for further details of any product.

CARRIAGE COSTS

Micro's, Monitors, Disc Drives, Printers £8.00. Books £1 each. Cassette Decks £2.00. Leads and software 50p/item.
Three items – no charge.

computerama

The Midland's Home Computer Specialists.

STAFFORD
59 Foregate Street, Stafford,
ST16 2PR. Tel: (0785) 41899

STOKE-ON-TRENT
11 Market Square Arcade,
Hanley, Stoke-on-Trent,
ST1 1PD.
Tel: (0782) 268620

BBC
SERVICE
INFORMATION
CENTRE

SHREWSBURY
13 Castle Gates, Shrewsbury
SY1 2AB. Tel: (0743) 60528

Access
BARCLAYCARD VISA

From Page 80

Table 1 illustrates the format for variable storage.

Type M=&1000 press Return f0 Return. You should see:

```
1000  3D  10  25   0  23  49   0   0     1070   0  75  10  11   9  65  66  67
1008   0   0  25   0  34  12   0   0     1078  68  69  6A  6B  6C  6D   0   0
1010  2A  10  41  44  25   0  82  34     1080   0   0   0   0   0   0   0   0
1018   0   0  5A  10   0  8E  52  24     1088  61  62  24   0  90  10  11   9
1020   0   0  6A  10   0  85  5C  CC     1090  61  61  61  61  61  61  61  61
1028  CC  CD   0   0   0  89  74  D9     1098  61   0   0   0   0   0   0   0
1030  99  9A   0   0  73  74  75   0     10A0   0   0   0  25  28   0   3   6
1038  85  4D   A  3D  71   0   0  64     10A8   0   0   0   0   0  19  45   0
1040  72   0  81  20   0   0   0   0     10B0   0  29  15   0   0  15  29   0
1048   0  72  65  64   0  8D  48   0     10B8   0  12  95   0   0  52   1   0
1050   0   0   0   0   0  85  4B   0     10C0   0  D1  10   0  8D   4   0   0
1058   0   0  A1  10  42  43  24   0     10C8   0  DA  10   0  88   0   0   0
1060  64  10   6   6  61  62  63  64     10D0   0   0   0  4C   0  8D   3  C0
1068  65  66   0   0  63  64  65  24     10D8   0   0   0   0  4C   0  84   0
```

Table 1

```
1000  3D  10  25   0  23  49   0   0
```

With the help of the variable map it can be seen that the first variable stored is a%, and that the next variable beginning with a is stored at &103D.

```
1008   0   0  25   0  34  12   0   0
```

The second variable declared was £%. The '0 0' at the beginning of the variable signifies that their are no more variables beginning with £.

```
1010  2A  10  41  44  25   0  82  34   0   0
```

The third variable was ZAD%. Notice that it is two bytes longer than a% because its name has two additional letters.

```
101A  5A  10   0  8E  52  24   0   0
```

The next variable is A, which is a floating point number and its value is stored in a complicated way as a bicimal number, that is, a binary coded decimal number.

If you want to learn how it works see "Assembly Language Programming for the BBC" by Ian Birnbaum. As usual the first two bytes point to the next variable, in this case ABC$ which is stored at &105A.

The other variables can be unravelled in a similar way.

FOR THE BBC MICROCOMPUTER

TINY PASCAL
PASCAL-T is a 16K Eprom program capable of compiling source PASCAL into a compact very fast threaded-interpreters-code. Full editor and disc support are included and the program is supplied with comprehensive documentation.

Price £59.00 + VAT

X CAL
An expert computer-aided learning package in 16K Eprom and support disc. No programming skill required to construct learning sessions as the program is screen driven. Facilities include text pages, graphics and histograms.

Price £65.00 + VAT

FORTH
FIG-FORTH in 8K Eprom together with manual.

Price £34.72 + VAT

LOGO-FORTH
A 16K Eprom program introducing this very powerful but extremely friendly Turtle-graphics language. Users also have full access to the FIG-FORTH support nucleus. Full documentation is included.

Price £59.00 + VAT

Retail/Mail Order/Dealer Enquiries to:-

H.C.C.S. Associates
533 Durham Road, Low Fell, Gateshead,
Tyne & Wear NE9 5EY. Tel: (0632) 821924

Retail sales also at:-
H.C.C.S. Microcomputers
122 Darwen Street, Blackburn, Lancs.
Tel: (0254) 672214

UROM
FOR THE BBC MICRO

UROM is a ROM chip containing a number of time-saving utility programs for your BBC Micro. It is an essential tool for the development of both BASIC and machine-code programs.

Features include:

- ★ **Disassembler**
- ★ **6502 Monitor**
- ★ **Cure 'bag program'**
- ★ **Edit envelope**
- ★ **Find and replace**
- ★ **Character define**

plus many more

FITTED IN MINUTES – SAVES HOURS!!

Available NOW – unbeatable value at **£19.95** (includes full instructions, VAT and P&P) – from:

J & H SOFTWARE,
'The Elms' Sussex Road, Southport
PR9 0SJ.

L.S.A. SYSTEMS

MARPLE COMPUTER CENTRE

BBC COMPUTERS

SERVICE & INFORMATION
CENTRE

30/32 Market Street,
Marple, Stockport, Cheshire.
Tel: 061-449 9933

Also Apple, Torch, Altos business systems.

Kudusoft

SOFTWARE FOR THE BBC MICRO

STAR PATROL: Multi-stage Space War. Differing situations. Enjoy the thrills – test your skills, flying your Spacecraft against the enemy. Full Colour and Sound effects.
For Model B: **£6.50** incl. p&p.

STARBATTLE: Destroy the Alien Starships before they get through to you. Avoid the onrushing meteorites. Increasing Skill Levels. Full Colour & Sound effects.
For Model B: **£5.50** incl. p&p.

STARLANDER: Full use of MODEL A. Test your skills in landing your Starship under increasingly difficult conditions. Full Colour and Sound.
£3.50 incl. p&p

KUDUSOFT, 130 Main Street, Tweedmouth,
Berwick-upon-Tweed. TD15 2AW.

"Always Something New"

Tel: 0289 306622

747
*CURRENTLY ON
PRESTEL VIA
MICRONET 800

BBC 32K 747 FLIGHT SIMULATOR & BRIEFING

ALL OPERATING SYSTEMS

A full blown, pilot written simulation (writer of the famous Atom 747) real time instrument and visual display, 3D runway view (Heathrow or Gatwick), large dials, moving pointers plus digital readout. Demonstration approach and landing. Full, separate briefing program. Area chart, notes and flight plan. Fantastic!

*CURRENTLY ON
PRESTEL VIA
MICRONET 800

Wolfpack III

BBC 32K, all operating systems

Combat briefing and program

"Sometimes your first warning is a lancing disruptor beam striking from beyond—sometimes they materialise close at hand. You are either quick or dead!" "A think, zap and think again game!"

True in-space cumulative motion, amazing full colour Starfield graphics & sound. Multiple ship control, each ship has its own mission and destiny, 4 types of enemy, meteor strikes. Good strategy rewarded by energy & promotion. Poor combat rewarded by death! (but rescue/refuel possible). Rotating base station.
SPEECH ROM? TABLES TEACHER! The DOC speaks! Learn multiplication in several different, interesting and colourful ways. (Runs OK without S.R. but DOC is silent!) (Add £4.00 for disc version).
KREMLIN multi level maze escape with Gremlins/bomb/3D graphics and sound/map/compass/quiet explore option!
HARMONY: infinite, saveable, 3D patterns of colour and sound, menu driven.
WORD PERFECT friendly and versatile, full facility 40/80 column word processor (add £4 for disc version)

DEALERS ONLY PLEASE PHONE (0903) 206076 **ROYALTIES** DOC PAYS THE BEST FOR THE BEST

Orders to: **Doctor Soft, 258 Coneygree**
Rd., Peterborough PE2 8LR
NO extras all prices fully inclusive

- **Special offer £1 off for 2 items, £2 off for 3 items, etc**

.... copies of	747 @	£7.95
.... copies of	Wolfpack	£7.95
.... copies of	Tables Teacher	£7.95
.... copies of	Kremlin	£6.95
.... copies of	Harmony	£6.95
.... copies of	Word Perfect	£9.95
	TOTAL £	

Name..

Address..

....

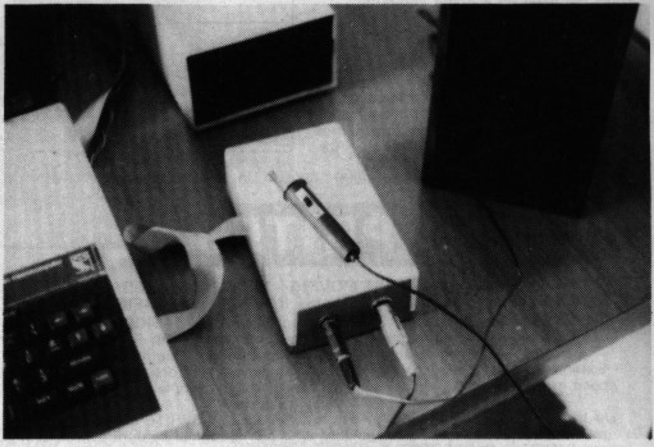
....

DOCTOR SOFT

ADVANCED SOFTWARE

Give your BBC Micro a REAL voice.

With the Voxbox voice digitiser.



Normal human voice can now be stored on disc and accessed from your own programs. Store words or phrases in English or any other language.
The Voxbox comes complete with a speaker, microphone and full operating software to enable you to build your own voice files. Just plug into the User Port.

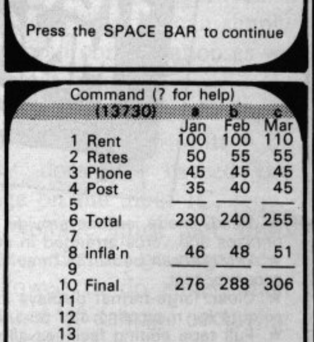
It speaks for itself.

Multiplex Computer Services
250, Eastern Road, Brighton BN2 5TA.
Tel: (0273) 606860

CONTEX

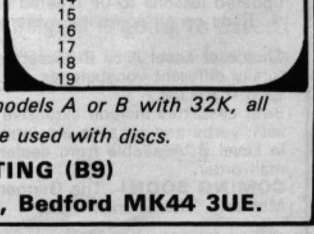
Professional Software for the BBC Computer

TYPING TUTOR 32K
Specifically designed for the BBC micro the 90 smoothly graded lessons and the free form option teach and encourage fast touch typing. Intelligently checks for errors, monitors progress, times (WPM) and makes recommendations. Audio key feedback, metronomic pacing, clock and revised performance options. Auto keyboard/finger display for every lesson. Add own lessons if required. 12 page instruction booklet.
£9.99 inc.



```
Lesson 75, line 1      23

Copy text as it is presented
Timing starts when you start
and stops when req'd no. of
characters typed.

I am delighted to tell you that I have
I am delighted to tll you that I have

Your time is 20 words per minute
Your error rate was 8%

Press the SPACE BAR to continue
```

SPREADSHEET 32K
A complete and versatile 'calc' program and tutorial. Models over 1,000 cells using up to 26 columns and 99 rows. Equations, constants, data or text in any cell. Emphasis on ease of use. 10 chr columns; 9 digit accuracy; print; row & col insert or delete; functions; colour; variables; save & restore; copy cell; auto replicate col & row; auto formulae adjust; scroll; search; help; evaluate; limits. 20 page instruction booklet.
£9.99



```
      Command (? for help)
       (13730)      a     b     c
                   Jan   Feb   Mar
   1 Rent          100   100   110
   2 Rates          50    55    55
   3 Phone          45    45    45
   4 Post           35    40    45
   5               ___   ___   ___
   6 Total         230   240   255
   7
   8 infla'n        46    48    51
   9               ___   ___   ___
  10 Final         276   288   306
  11
  12
  13
  14
  15
  16
  17
  18
  19
```

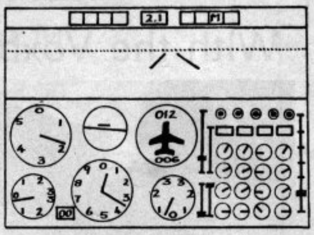
Fast delivery. Cassette based for models A or B with 32K, all operating systems, may be used with discs.

CONTEX COMPUTING (B9)
15 Woodlands Close, Cople, Bedford MK44 3UE.

DRAGON/32 **BBC MODEL/B** **TRS 80 C/C 32K**

747 FLIGHT SIMULATOR

Superbly realistic instrumentation and pilot's view in lifelike simulation which includes emergencies such as engine fires and systems failures. This program uses high resolution graphics to the full to produce the most realistic flight-deck display yet seen on a home computer. There are 21 real dials and 25 other indicators (see diagram). Your controls operate throttle, ailerons, elevators, flaps, slats, spoilers, landing gear, reverse thrust, brakes, etc. You see the runway in true perspective. Uses joysticks and includes options to start with take-off or random landing approach. **"A real simulation, not just another game."** (Your Computer Apr. 83).



CASSETTE £9.95 (pp and VAT included)

In U.S. $27.95 (pp included)

BBC/B **SPRITES** BBC/B

THEY ARE HERE · NOW · FAST MOVING · MULTI COLOURED · ANIMATED · CONTROLLED FROM BASIC · FOR USE IN YOUR OWN BASIC PROGRAMS

The most significant software announcement since BBC-BASIC itself. Now you can write your own high-speed arcade games in basic with SPRITES which move at any speed in any direction you command. This machine-code extension to your BBC graphics gives you all you ever dreamed of in high speed, multi coloured animation. No complications – simple to use and giving the following features:-

Up to 32 SPRITES on screen at any time – includes SPRITE GENERATOR to give endless SPRITE design capability with all 16 logical colours available in each SPRITE – Each SPRITE has two images to allow animation, e.g. walking man, pulsating invader, etc. – Comes with full colour user manual, full of examples and two free games to demonstrate amazing capabilities (listings included).

Watch out for rave reviews.

CASSETTE **£17.95** (inc. pp and VAT) in U.S. **$49.95**

UK Dealers contact: **Micro-Aids, Beech House, Hob Hey Lane, Culcheth, Warrington. Tel: 092 576 2613**

THE GUNS OF NAVARONE Cassette £7.95 (pp and VAT included)
In U.S. $21.95 (pp included)

MERCY MISSION TO MARS Cassette £5.95 (pp and VAT included)
In U.S. $15.95 (pp included)

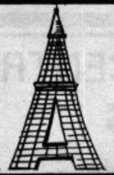
15 years professional computer experience.

D.A.C.C. LTD., Dept BMU, 23 Waverley Road, Hindley, Greater Manchester WN2 3BN.
(Despatch within 48 hours)

In U.S. order from sole distributor: **Frank Ashton, Dept. BMU, P.O. Box 7037, Chula Vista, CA 92012-7037**
(California residents add 6% sales tax).

EIFFEL TOWER

by Chris Somerville



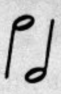
Visiting France? Learning French? Learn/revise/practice your French vocabulary with this unique animated program that builds the Eiffel Tower. Hundreds of words built in. 'Store your own' option too! Which class will you reach? Master builder? Or welder's mate? Two programs for £9.25 (inc. VAT) BBC 'B' and Spectrum 48k.

PIRATE

is a new adventure game for young people. You are a pirate and it's your job to explore an uncharted ocean! Simple function key presses (no spelling needed) ensure easy sailing around the new world. What will you find? Treasure trove? Savage islanders? There has NEVER been a BBC game like it. (Save-game feature included). Two programs for £9.25 (inc. VAT) BBC 'B' and Spectrum 48k.

TOP OF THE POPS

–new release!



is our latest and greatest simulation game. So you want to be a pop star? The computer will intereview you, audition you, groom you for stardom. Can you control your budget and get the tune that you created into the TOP Twenty? Designed for 2 groups of children to play at the same time . . . but the public can be very fickle remember! One long program for £9.25 (inc. VAT) BBC 'B' and Spectrum 48k.

Details of these and more from (SAE, please):

Home/Trade enquiries/orders to:

chalksoft LTD.
37 Willowslea Road,
Northwick, Worcester
Tel: (0905) 55192

Educational orders direct to our educational distributors:

WARD LOCK EDUCATIONAL,
47 Marylebone Lane,
London
W1M 6AX
(01-486 3271)

WLE

Chalksoft – the *innovators* in EDUCATIONAL software . . .

A Ling Kee Company

Introducing . . NEW

BBC
Micro
Model B
kosmos
Software
A French Language
Learning Aid.
The
French
Mistress

- ★ Pupils
- ★ Teachers
- ★ Travellers
- ★ Students
- ★ Graduates
- ★ Linguists
- ★ In fact anyone having an interest in French will benefit from this unique language learning aid

★ Ready made lessons provide an enormous vocabulary of words, phrases and verbs arranged in subject groups.

★ Lessons can be run in three ways; learning, self-test or speed and accuracy test.

★ Clear, large-format displays including all French accents; different colours for masculine and feminine words.

★ Full tape editing facilities allow an infinite number of new or updated lessons to be created and stored for later use.

★ Runs on all operating systems including systems fitted with disc.

Choice of Level A or B cassettes with totally different vocabularies. **£9.95** each (P&P inc.)

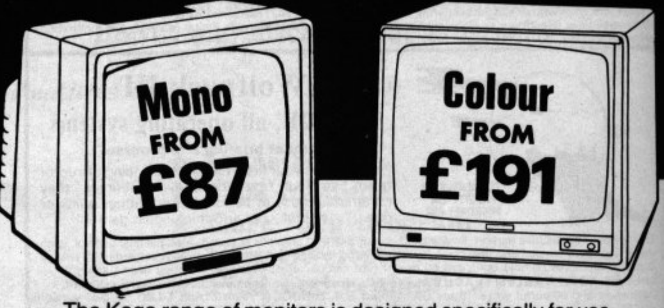
Both cassettes include extensive word lists; verbs and phrases are introduced in Level B. Available from dealers or mail order.

COMING SOON! "The German Master", "The Spanish Tutor"

kosmos
SOFTWARE

1 Pilgrims Close, Harlington,
Beds. LU5 6LX.
Tel: 05255 3942

AT THESE PRICES YOU CAN SWITCH OVER TO A PROFESSIONAL KAGA MONITOR



The Kaga range of monitors is designed specifically for use with micro-computers, offering flicker-free character and graphic displays. There is a Kaga monitor suitable for use with your system, be it an Apple, Commodore, BBC Acorn, Osborne, Tandy, NEC, Sharp or any other popular micro.

■ High-res. 12" Green inc. Cable	£87
■ High-res. 12" Amber inc. Cable	£95
■ 12" RGB Colour Monitor (med. res.)	£191
■ 12" RGB Colour Monitor (high res.)	£228
■ 12" RGB Colour Monitor (super high res.)	£319
■ RGB Cable for IBM P/C	£9

For your BBC Acorn

Phone for our latest low prices.

AIMGRAM (09277) 68211

AIMGRAM LTD 31 Roman Gardens, Kings Langley, Herts WD4 8LG Tel: Kings Langley

THE BEEB BODY BUILDING COURSE

PART 7

You and your micro in splendid isolation

By MIKE COOK

ARE you a computer phobic? Scared to touch anything inside the machine lest you turn to stone or, even worse, your micro turns back into a passive lump of silicon? If so you have probably not got very far with interfacing your micro to the outside world.

This month we offer the solution to all your worries, and show you how you can preserve the health of your favourite micro by putting it in splendid isolation.

People often ask me how easy it is to damage a computer. Well, short of dropping it in front of a steam roller, the only surefire way is to feed an excess voltage into an input.

If you are lucky this will only blow the chip connected to the input. But if you really want to damage things, then put a high voltage such as the mains on a logic input.

What tends to happen is that the chip vaporises leaving a small blowhole in the plastic where the vaporised metal escaped from its lonely life in the solid phase.

Also the abnormally high voltage will leak onto the power supply rail and subject every device to an over-voltage. The result is that every chip is blown.

And it needn't necessarily be mains power that creates the havoc. I once had a board to repair where somebody had put a + 80 volt teleprinter signal into a TTL input with similar results.

For those of you who might be tempted to use a fuse in a circuit to protect it, I will remind you of one of the laws of electronics:

A semiconductor is a device designed to burn out very quickly and in so doing protect your fuses from harm.

This tale of woe might be beginning to put you off. So this month we shall see how we can prevent any disasters from happening.

As we have seen in previous months, a lot of signals that we might wish to monitor are simple contact closures. All that is needed is a pull up resistor as shown in Figure I.

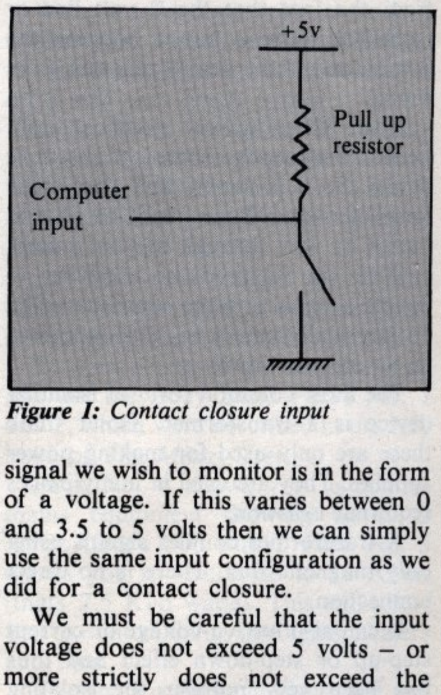


Figure I: Contact closure input

However there are times when the signal we wish to monitor is in the form of a voltage. If this varies between 0 and 3.5 to 5 volts then we can simply use the same input configuration as we did for a contact closure.

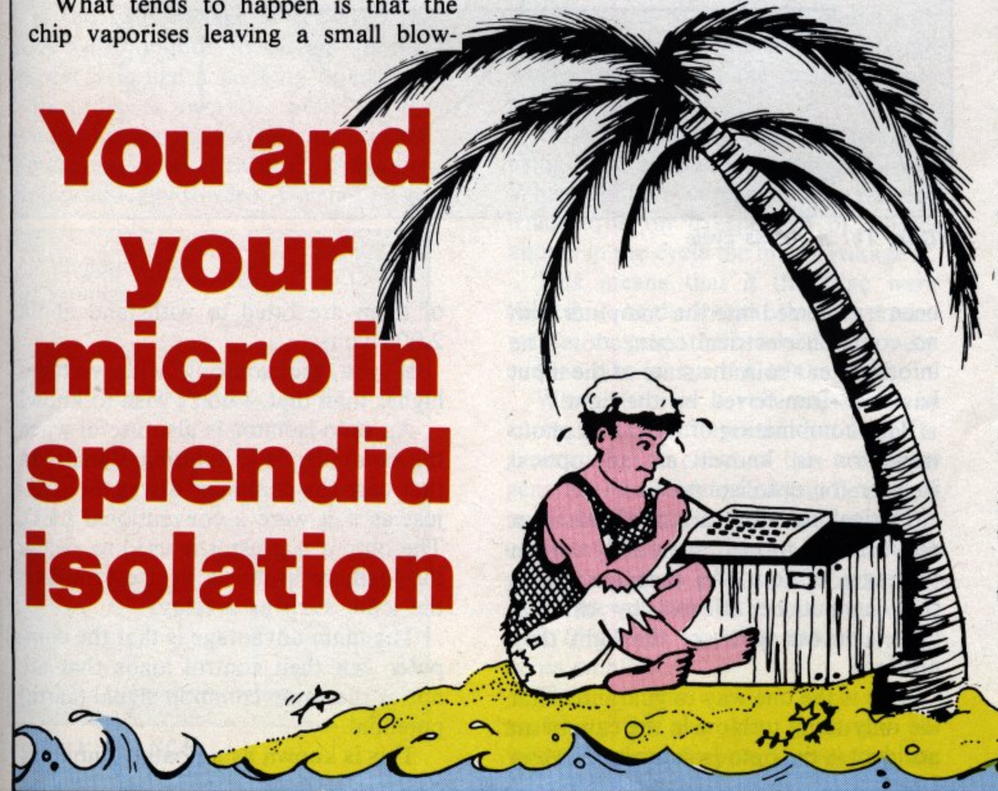
We must be careful that the input voltage does not exceed 5 volts – or more strictly does not exceed the supply voltage on the input IC.

Also the voltage must not drop below 0 volts – that is, go negative.

If it is allowed to do either, then there is a chance of damage occurring to the input IC.

If any input signal is going to exceed the required voltage then we have to

→



From Page 85

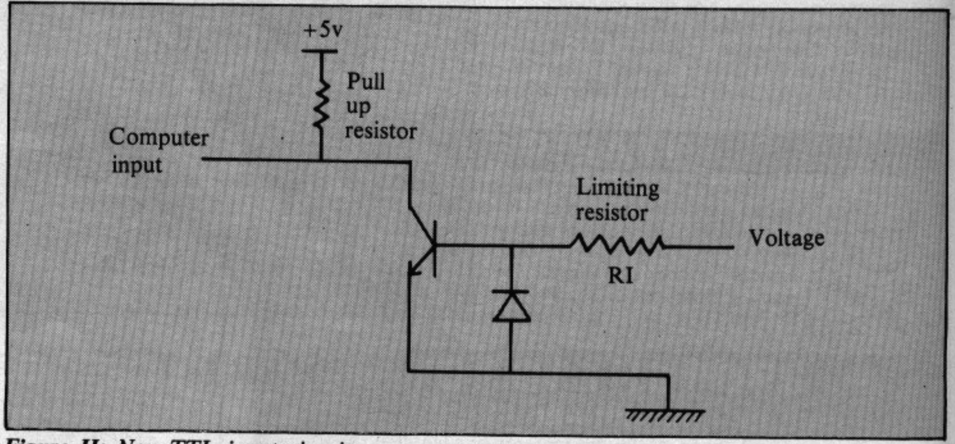


***Figure II:** Non TTL input circuit*

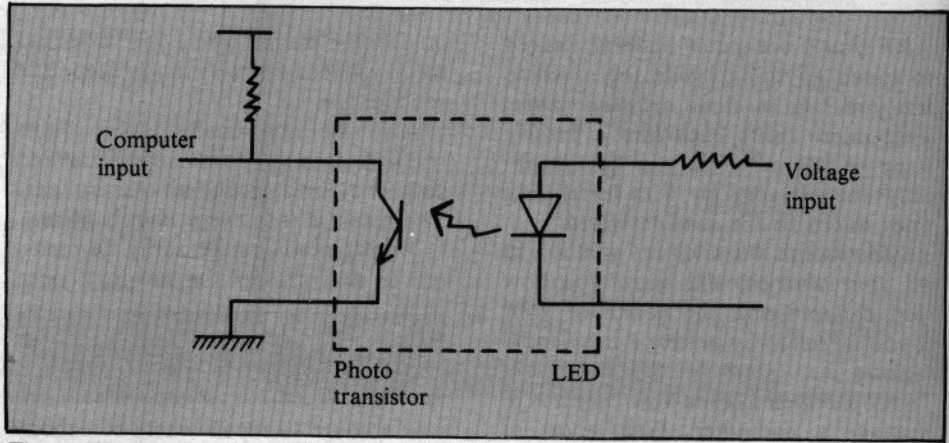


***Figure III:** An optical isolator*

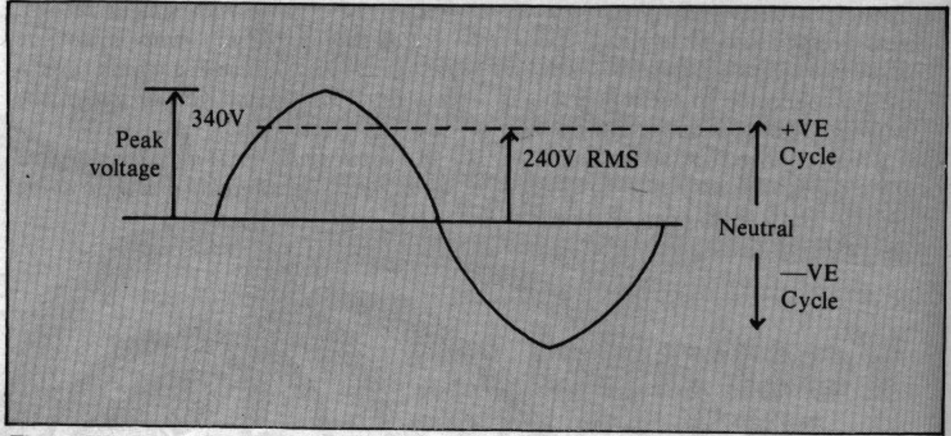


***Figure IV:** A mains cycle*

knock it into shape so it conforms to what we want. This can be done by using the circuit shown in Figure II.

Any positive voltage will turn the transistor on and so put a logic 0 into the computer. The resistor R1 should be chosen so that there is about 1mA flowing through it when the input voltage is at its maximum.

This can easily be calculated using Ohm's law (see the July issue of *The Micro User*). The diode in the circuit is to prevent the transistor from being damaged when the input voltage goes negative.

If this will not happen the diode can be omitted. This type of circuit affords quite good protection against quite high voltages.

So, not only can you monitor voltages higher than TTL levels but also, if an accident results in an even larger voltage being fed in, only the transistor will blow and not your input IC.

Effective as the circuit is, it suffers from the fact that the 0 volt line or earth has to be common between the computer and the device generating the signal.

Also, there is an electrical connection between the computer and your device. So it is conceivable that some form of over voltage might be able to punch its way through to your micro.

What is required is a device to couple a signal into the computer using no physical connection. This is known as an isolated input.

The most common form of isolating device is a transformer. Don't think these are only used for making power supplies. They are used in many places requiring isolation.

A transformer couples signals using only magnetic flux. There is no direct connection.

It can also have a voltage or current step-up or step-down effect and thus has been very popular for isolating devices.

The transformer however, can only couple AC signals and so is not much use for coupling the steady levels of logic. Therefore some new type of isolating device is needed that will respond to a DC signal.

Consider Figure III. If we arrange a LED (Light Emitting Diode) to be close to a photo transistor then, when the light is on, the transistor is on and when it is off the transistor is also off.

So the state of the input signal has been transferred into the computer with no common electrical connection. The information about the state of the input has been transferred by the light.

This combination of LED and photo transistor is known as an optical isolator (or opto-isolator).

Optical isolators are available in a number of forms, separately or in packages of four. As they are sealed they cannot be affected by external light, nor can you see the light they produce.

This is the one way to guarantee that the only thing to blow in the case of an accident is the opto-isolator itself. Most of them are rated to withstand about 2,000 volts.

If you are working with voltages higher than that, I don't wish to know!

An opto-isolator is also useful when the computer is outputting signals. In that case the computer drives the LED just as if it were a conventional LED. The output transistor is used to switch the load, or switch a device to switch the load, such as a relay.

The main advantage is that the computer can then control loads that are not at the same common signal (earth) potential.

This is known as a floating output as

one end of the signal is not tied down to any potential. Even mains voltages may be switched directly using this form of isolation.

If you want to switch mains voltages you will need something more substantial than a transistor. The mains in Britain are 240 volt RMS AC.

RMS stands for Root Mean Square and is a mathematical way of equating the effect of an alternating current waveform to a direct current. As you can see from Figure IV, the peak voltage of the mains is very much higher but because it is constantly changing an RMS measure is more convenient.

In order to switch mains, a semiconductor device has to withstand the peak voltage of the mains in both the positive and negative direction. There are two semiconductor devices which do this.

Let us look at the simplest one first, the SCR.

The SCR (silicon controlled rectifier), sometimes also called a thyristor, is a four layer PNPN structure. It is pointless going into the physics of how the device works so I will concentrate on how it operates.

Figure V shows an SCR. When a positive voltage is applied to the anode there will be no current flow (the device is off).

If a small voltage is applied to the gate connection the SCR will turn on and the current flow will be limited only by the load.

If the gate voltage is removed the SCR will continue to be on. In that respect it is like a latching relay.

In order to turn the SCR off the voltage across the anode/cathode and the current flowing through it have to drop practically to zero. Turning off an SCR is known as commutating it.

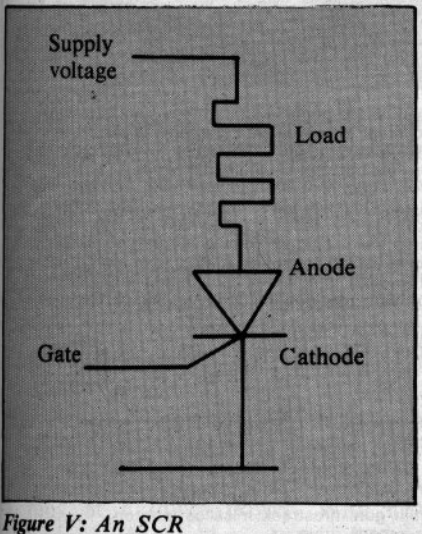


Figure V: An SCR

If the supply voltage is an AC waveform then the SCR will turn off the next half cycle after the gate voltage is removed.

The SCR will only conduct on one half of the mains cycle, and so any load will only be on for half the time. In other words it will only be consuming half the power.

What is needed is an SCR to conduct on the positive half of a mains cycle, and another connected in the reverse direction to conduct on the negative half cycle. Essentially this is the way a triac works.

A triac is shown in Figure VI. It will turn on when a voltage of any polarity is applied to the gate.

As it conducts on both halves of the mains cycle it will deliver full power to the load when it is switched on. We can use this arrangement to allow our micro to control mains equipment.

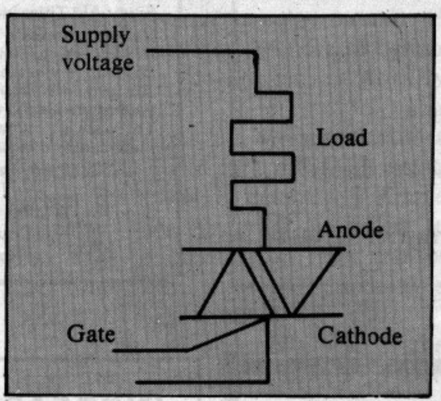


Figure VI: A Triac

Triacs and SCRs are available with built-in opto-isolators so we need not worry about letting the mains get into our equipment.

However there is a small snag to using just a triac to switch a load. When a pulse is supplied to the gate the triac turns on irrespective of whereabouts in the cycle the mains voltage is.

This means that if the triac were turned on at the instant that the mains was at its peak there would be a very sudden rise in current in the load.

When there is a very rapid rise in current, electromagnetic radiation is generated. The effect of this will be to generate interference that can be picked up on radios, hi-fis and, worst of all, on cassette tape recorders – like the one you are trying to save your program on.

To prevent this we must arrange the triac to turn on when the mains cycle is at its smallest.

This is known as zero point switching, as the triac is turned on when the mains cycle is crossing the zero voltage axis. This will then minimise any radiated interference.

Fortunately there is no need to construct a zero point switching circuit. As it is such a common requirement, manufacturers have combined a triac, zero point switch and opto-isolator in a single package.

These are designed to switch mains devices and are known as "solid state relays".

They are mainly characterised by the amount of current they can switch.

For switching large loads (10 Amps) they need to be mounted on a heat sink as they get quite warm, but the smaller ones (2 Amps) do not need one.

With a solid state relay there is a tendency for a small amount of leakage to take place. That is, when the relay is off it will pass about 6 mA.

Since this is negligible for virtually all loads, for most purposes the load will appear off. However, it is not a switch, so keep your fingers out if you want to avoid shocks!

As solid state relays are a little difficult to get hold of we have produced Body Build Packs Nos. 4 and 5.

To gain access to the user port you can use the Body Build Packs No. 1 and 2, which were described in the July issue of *The Micro User*.

Pack No. 4 allows you to control mains equipment drawing up to 2 Amps (that's 500 watts). Pack No. 5 allows you to switch up to 10 Amps (thats 2.5 Kilo watts). This will allow you to control things like lights, heaters and fans.

The circuit is shown in Figure VII and is the same for each pack. You will see that the buffer transistor is arranged as a current shunt switch.

In this arrangement, when the transistor is on, current that would normally flow through the load is short-circuited, or shunted, through the transistor. This is so that when there is a logic one on the output, the relay is turned off.

If is important to arrange it this way

→

Soft Smith

UTILITY ROM

for the **BBC Micro**

All these features, *instantly*, at the touch of a key:

Start Menu	• all functions initiated by one keystroke.
Disassembler	• full listing format to screen & /or printer; • Hex & ASCII representations of data; • disassembled text can be saved to a file & *EXEC'd back for editing & re-assembly.
Memory Editor	• scroll back & forth displaying blocks of memory in Hex & ASCII. • Overwrite any section.
Search string	• search current BASIC program (anywhere in RAM); • search string can include BASIC keyword tokens & 'wild cards'; • each occurrence highlighted within whole program line; • options then available include: find next occurrence, list program from that point, return to BASIC or menu; • useful for listing PROC & FN definitions & where used.
Replace string	• same features as search: *plus* extra option to replace search string by a new string - any size from 0 to size of original string; • all, or only selected items may be replaced; • ideal for removing spaces, compressing variable names, etc.
Program repair	• makes any 'Bad Program' available for editing.
Variable Dump	• lists the names & contents of all scalar program variables; • for arrays, only the number of elements is given; • for floating point, accuracy is 2 decimal places.(+0-2)

All routines can output to printer &/or screen.
In screen mode, colour highlighting is used to aid readability.

ROM is entered by a single keyword which can be called from soft keys, immediate command, or within a program.

Suitable for A & B models, but must be **OS 1.0** or above.

Full details available on request.
Price, including p&p, plus full fitting & operating instructions: **£12.95**

Send cheque or P.O. to:
SoftSmith, 9 Back Green, HERSHAM, Surrey KT12 4HY

SMALL SCHOOL Software

STUDY PACKS
and
STUDY AIDS

For BBC Model A(32K) & B
Sinclair Spectrum 48K

SMALL SCHOOL Software STUDY PACKAGES are designed to a high specification by experienced teachers for use both at Home and in School.

The STUDY PACKS are based on well established individualised learning techniques and are aimed at students working on their own or in small groups. They consist of a suite of objective matched lessons, a review program and a Post Test with diagnostic on cassette tape, plus a Manual/Workbooklet that contains User Notes, Pack description, essential consolidation exercises with answers and special stationery and Record Sheet. The STUDY AID packages are special one off computer based programs or collections of programs that are of use in support of learning both at home and in school. They are again fully supported by a User's Manual and are created to the same high specification as the STUDY PACKS.

Study Pack Titles include:

The Theorem of Pythagoras (Model B) –
Designed to teach the Theorem of Pythagoras and its applications.

First Steps in Algebra (Model B and Spectrum) –
Introduces via 'mapping machines' the use of letters to define variables in simple operations leading to the solution of simple equations and problems.

Algebra Two (Model B) –
Follows on from 'First Steps . . ' to teach collection of terms, simplification of simple linear algebraic expressions not including brackets and the solution linear equations in one variable.

Introduction to Trigonometry (Model B) –
From considering a rotating unit vector, the Study Pack establishes the sine and cosine curves for 0° to 360° and the use of tables to find the sine or cosine of any angle greater than 90°. By use of enlargements, shows how these ratios can be applied to the solution of right angled triangles.

Study Aid Titles include:

Mental Arithmetic Tests (Model B, Spectrum) –
is designed to help implement the recommendations of the Cockcroft Committee that there be frequent practice in Mental Arithmetic. The Study Aid provides balanced Tests at 7 levels and 3 degrees of difficulty for youngsters aged 8 upwards to 14, covering most areas of basic numeracy. The package contains two versions, one for class use, the other for the individual and includes a Tables Practice program.

All Study Packs cost £7.95, while the Study Aids cost £6.95.
The prices include Postage and Packing.

Send for the latest Information Pack to:–

Small School Software, 41 Sinah Lane,
Hayling Island, Hampshire PO11 0HJ

GLENGARY SOFT

"MICROQUEST" £5.95 Fascinating quest through the 'BEEB'. Find your way to the end of the quest by using your GUIDE. This program will help you learn more about your computer as the quest progresses.

"SORCERERS KINGDOM" £6.95 Can you defeat the Black Sorcerer and the dreaded Trolls, find the treasure and escape from the Mountain of Mirth? Will you plummet down the Falls of Death or be eaten by a Sabre-toothed Tiger? To find the answers play this adventure.

"CONCENTRATION £6.95 Absorbing battle of wits for two players, or you play against computer. In the latter case the computer automatically regulates its own skill level in accordance with that of the human. This original game is based on the card game of pairs.

"FORCASTER" £4.95 To predict your football pools. Update info weekly with latest results, and save onto tape. 7 ways to predict.

"QUESTIONS" £6.95 Allows up to 50 questions having up to 5 answers each to be programmed and saved onto tape/disc. Edit facility to change any question as needed. Results can be printed out if required. If wrong answer given, computer gives correct answer. Marks awarded as a percentage at end of questions.

"ARITHMETIC" £6.95 This program allows counting, multiplication, division, subtraction, addition and tables. Difficulty is variable by altering parameters at start of program. For all ages up to 12.

"DATABASE" £7.95 An excellent program to suit your filing needs. Allows you to sort, search, add, edit, save, print-out.

"HOMEDATA" £6.95 Allows you to calculate and predict your monthly finances, and save on tape.

– ALL PRICES FULLY INCLUSIVE –

The above programs run on all O.S. and 32K.

40% ROYALTIES

Paid to the writers of high quality original software, including:- Games, Educational, Business & Domestic for use on the 'Beeb'.

GLEN GARY SOFT

9 HIGHFIELD CRESCENT,
HORNCHURCH, ESSEX
RM12 6QB
TEL: HORNCHURCH
(04024) 40864

INCREASE YOUR FIRE POWER !!!!

There you are, ZAPPING away with your laser, happily defending your planet when; suddenly – you're surrounded. Your one chance? a SMART BOMB. You reach for the keyboard – your spaceship nose dives and CRASH!!! – Wiped out. Later, on your cloud, playing your digital harp, you think "If only the SMART BOMB button had been next to the laser on the handset? I'd be alive today.", "If only the joystick had sprung back to centre at least I'd be still up there fighting."
NOW!! TO SAVE THE WORLD. THE NEW DELTA 14 RANGE OF HANDSETS FROM VOLTMACE.

Used for years by DATABASE video game owners these handsets have sprung return, nylon coated steel joysticks with graphite wiper potentiometers for longer life and SMOO-OO-OO-THER control, plus 12 pushbuttons with two extra fire buttons to share the wear.
The DELTA 14 comes in two parts. One handset will plug into the 15 way "D" plug to give analogue joystick plus three button functions. The second part is the DELTA 14B/1 adapter box which plugs onto the 15 way "D" and connects to the user port. This gives use of all 12 buttons on the user port using a 3 x 4 strobed matrix. The eighth line is used to select a second joystick which can be plugged into the adapter box. Suggested software routines included with each handset.

DELTA 14 B JOYSTICK HANDSET FOR BBC £10.95
DELTA 14 B/1 ADAPTER BOX & CABLE £13.95
Including VAT and 1st Class Post.

Access

Cheques or postal orders to:

VOLTMACE LTD., Park Drive, Baldock, Herts (0462 894410)
Callers welcome Monday to Friday. Trade quantity discounts.

"Maybe I could have a gatlin gun, firestreak missiles, photon torpedoes, warp drive, Hyperspace drive . . . . "

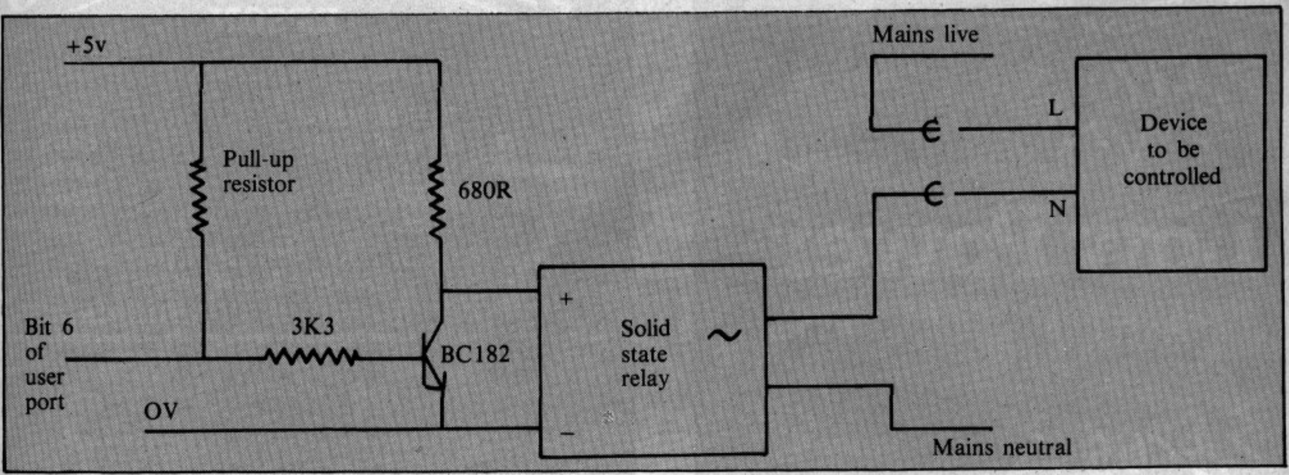


Figure VII: A solid state relay interface

From Page 87

round as when the VIA is initialised as an input – as it is on power up – or when the BREAK key is pressed, the result appears to be a logic one. That is, the line floats high.

So by arranging the relay to be off with a logic one we prevent anything suddenly starting up and also make the BREAK key a panic button.

The circuit may be built up inside a wall-mounting mains socket with a plug and flying lead supplying the mains power, and the device needing to be controlled need not have its plug removed to be wired up.

The ability to control mains equipment opens up all sorts of possibilities for micro control.

For example you could easily make a light sequence controller for a disco. Or how about programming the real time clock to turn on your kettle in the morning ready for a cup of tea?

If you have not got an automatic kettle you could always get your micro to turn it off after the required amount of time.

Central heating control is possible, as is a really sophisticated video recorder timer.

You could even arrange your micro to turn your lights on and off while you are away so that potential burglars would know you had a computer set-up worth stealing!

In many applications you may want to vary the power of a device, such as a hair dryer or water heater. A simple way to do this is to rapidly turn the device on and off.

As you can switch each individual cycle with a solid state relay the result will appear to be that the device is running at a lower power. With lights, however, this will produce a flickering which may or may not be desirable.

It is possible to write a simple program to switch the relay on and off in such a way that the normal operation of the computer is totally unaffected.

The way to do it is by using the timer in the BBC micro to generate an event. When the event is detected a simple machine code program is called to invert the condition of the relay and set the timer with the appropriate time before the next event.

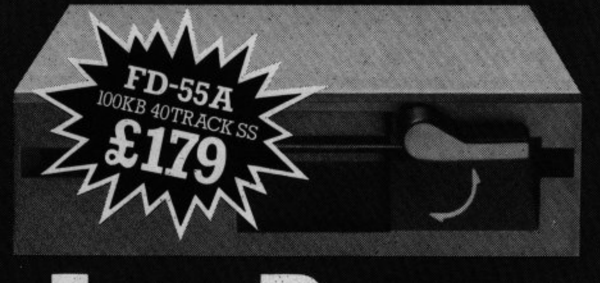
Thus the on and off times for the relay can simply be stored in two memory locations. If any program then changes the values in these locations, the on/off time ratio will be changed and so the power in the load varied.

A program to do this is shown in Program I. It firstly initialises the user port so that bit 6 is an output. Then the machine code event-handling routine is assembled into memory. You can change the routine's location by altering line 100.

Line 370 then places a pointer to the timer locations into memory, and the following loop initialises the on and off

```
   10 PRINT"SEPTEMBER 1983 MICRO USER"
   20 PRINT"BEEB BODY BUILDING COURSE"
   30 PRINT"Mike Cook."
   40 PRINT"DUTY CYCLE BACKGROUND TASK
"
   50 PRINT"LOCATION &80 CONTROLS ON T
IME"
   60 PRINT"LOCATION &85 CONTROLS OFF 
TIME"
   70 PRINT"BIT 6 ON USER PORT IS SWIT
CHED"
   80 ?&FE62=?&FE62 OR &40
   90 ?&FE60=?&FE60 OR &40
  100 PLACE=&A00
  110 FOR A=0 TO 2 STEP 2
  120 P%=PLACE
  130 [
  140 OPT A
  150 PHP
  160 CMP #5
  170 BNE NO
  180 STX &8B
  190 STY &8C
  200 LDA &FE60
  210 EOR #&40
  220 STA &FE60
  230 LDY #0
  240 LDA &8A
  250 EOR #5
  260 STA &8A
  270 TAX
  280 LDA #4
  290 JSR &FFF1
  300 LDX &8B
  310 LDY &8C
  320 LDA #5
  330 .NO PLP
  340 RTS
  350 ]
  360 NEXT
  370 ?&8A=&85
  380 FOR A=&80 TO &89
  390 ?A=&FF
  400 NEXT
  410 ?&220=PLACE MOD 256
  420 ?&221=PLACE DIV 256
  430 ?&80=&F0:?&85=&F0
  440 *FX14,5
  450 A%=5
  460  CALL PLACE
  470 END
```

Program I



Low Power

FD-55B
200KB 40TRACK DS
£265

Low Profile

FD-55E
200KB 80TRACK SS
£229

Low COST

FD-55F
400KB 80TRACK DS
£299

Now available from stock for the **BBC Model 'B'** with DFS disk interface, the very latest half-height disk drives from TEAC — world leaders in high performance 5¼ inch floppy disk drive technology.

Note: Our low prices include cables for direct connection to the Model 'B' but please add VAT. Post and packaging is FREE.

Dealers and Educational Establishments

- **Only 49mm high including feet.**
- **Outstanding reliability.**
- **Twelve month warranty.**

Telephone orders welcome with Barclaycard/Access.

Contact us for details of generous discounts.

2a Green Street
Sandbach
Cheshire
CW11 9AX

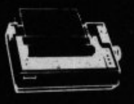
MAIL ORDER MICROS

Telephone 0782 811711

PRINTER BONANZA!

EPSON

PRINTERS AT UNBEATABLE PRICES



EPSON RX80	**£269** + VAT
EPSON FX80	**£359** + VAT
STAR 510	**£289** + VAT
STAR 515	**£389** + VAT
CP80	**£289** + VAT

THE NEW 'STAR' AND 'CP' PRINTERS – AS GOOD AS EPSON

STAR & EPSON – THE BEST ON THE MARKET.

All printers carry a 1 Year Guarantee and come with paper. Shipment is by TNT Overnight Express to your door – Please add £7 + VAT carriage.
Shipments throughout UK. We can export to most countries in the world.
Please phone for Access or Visa buying details.

As our prices vary from week to week, send for our full weekly stock/price sheet which will only cost you a SAE.
Be warned about price-cutting companies – make sure they are established and have the expertise to fulfil your needs (we have!).

IMMEDIATE DELIVERY.

Micro-Spares

We cannot and will not be beaten on Price!

Note our change of address
104-106 Hanover Street, Edinburgh EH2 1DR
031-226 3345

Simonsoft

Specialists in High Quality Software for the BBC Microcomputer

DISASSEMBLER (A/B) – a 'smart' disassembler that will generate fully labelled assembly listings of any machine code program – data is automatically differentiated from code and displayed together with its ASCII equivalent – the assembly listing can be saved in *EXEC format and subsequently incorporated into user programs – supplied with full instructions.
Without doubt the most powerful and flexible disassembler available
Disassembler £7.95

NEW

EMULATOR (B) – a new concept in machine code programming tools! Emulator is a machine code INTERPRETER which allows you to write and debug machine code as easily as BASIC – fully compatible with disassembler so that disassembled programs can be altered and 'emulated' – features single step, breakpoints register display, edit modes, data display mode etc etc – since the machine code is interpreted there is full protection from errors.
Probably the most useful machine code programming tool.
Emulator £8.45

NEW

BASIC GOODIES (A/B) – a set of useful BASIC debugging routines saved in *EXEC format and fully documented – includes PROC/FN LISTER which lists the lines where procedures and functions are defined together with, parameters etc – VARIABLE LISTER displays the current values of all or selected variables; very useful for debugging and demonstrations – SUPER REPORT intercepts BASIC errors and returns the message in a string variable so that error messages can be more flexibly reported – and more besides.
Basic Goodies £5.95

Prices are fully inclusive (for disc version add £3.00 and state single or double density)

All programs are fully guaranteed and OS 0.1 to 1.2 compatible.

DEALER ENQUIRIES WELCOME

Simonsoft

Front Street, Topcliffe, North Yorkshire, YO7 3RJ.

From Page 89

times to all ones (the minimum time).

Lines 410 and 420 direct the operating system to our event-handling routine and line 430 sets up an on-and-off time of 0.16 seconds.

Finally, line 440 enables the interval timer and lines 450 and 460 start off the background task.

When the program is run nothing will appear to happen and the computer will work normally except that bit 6 of the user port will be repeatedly switched on and off.

Any program that alters memory locations &80 and &85 will immediately change the on/off time. As the internal timer counts up, the value in these memory locations will have to be the inverse of the time you want – just swap the zeroes and the ones.

The machine code event-handling routine is called every time the internal timer times out. This is described in the User Guide.

It first puts the status register on the stack and tests the Accumulator to see if it has the number 5 in it.

This signifies that the event was a time-out condition. If this was not the cause then our routine is skipped.

Body Build Pack No. 4 consists of a solid state relay rated at 2 Amps, a transistor type BC 182, a 3K3 resistor, a 680R resistor.

Body Build Pack No. 5 consists of a solid state relay rated at 10 Amps, a transistor type BC 182, a 3K3 resistor, a 680R resistor.

● You can order these, as well as previous Body Build Packs, by using the form alongside.

The routine then salts away the value in the index registers, as the User Guide says that these should be preserved by any event-handling routine.

Then bit 6 on the user port is toggled along with the pointer to the memory location that has the on or off time in it.

This is then used to initialise the internal timer via an OSWORD routine. Finally the original values in the registers are restored.

This background task may be suspended at any time by disabling the internal timer event by a *FX13,5 instruction. Note that this also happens when the BREAK key is pressed.

If you want the switch to be on any output line other than bit 6 then change the mask in line 80,90 and 210.

Be it disco lights or electric toaster, with an optically isolated solid state relay you should be able to control them all with safety and ease using your micro.

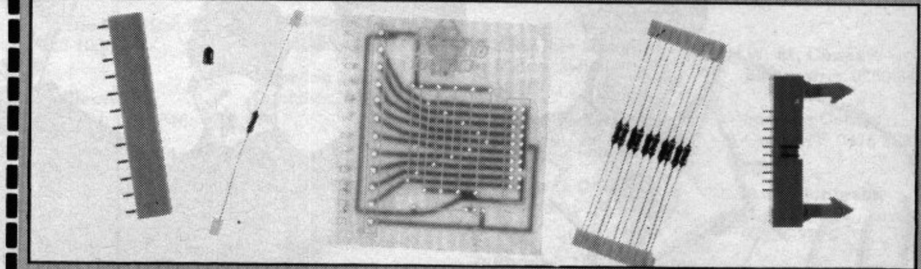
Bear in mind, however, that no amount of isolation will protect you from a sloppy and dangerous job. You are dealing with the mains electricity so respect it and you should be all right.

If you have followed the information you should now be able to put your computer into "Splendid Isolation".

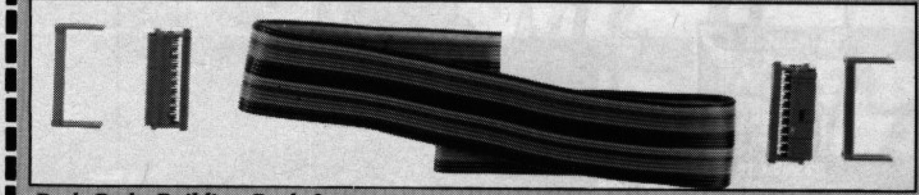
● Next month's exercise; Tripping the light fantastic. We find that the pen is mightier than the sword.

YOUR ORDER FORM

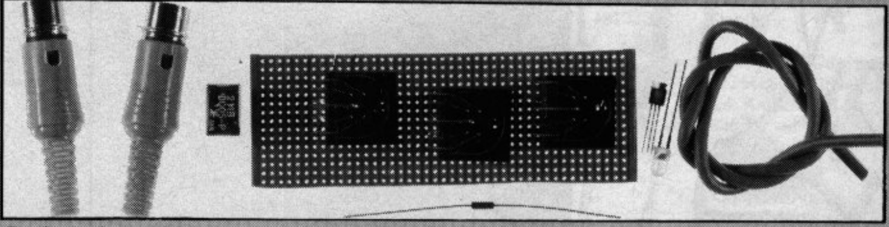
for the Beeb Body Building packs



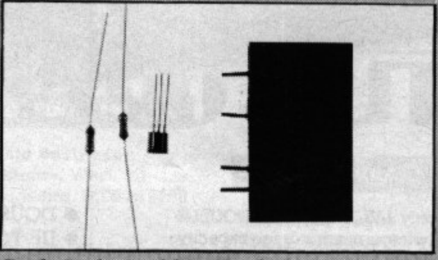
Beeb Body Building Pack 1



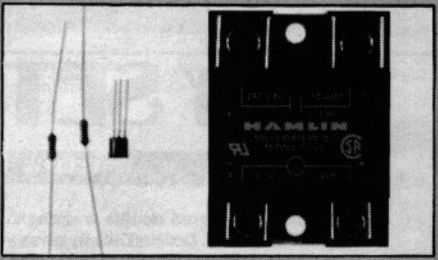
Beeb Body Building Pack 2



Beeb Body Building Pack 3



Beeb Body Building Pack 4



Beeb Body Building Pack 5

Beeb Body Building packs cost £9.95 for Packs 1 to 4, and £12.95 for pack 5. The prices include VAT. Packs 1 and 2 were described on Page 83 of the July issue, Pack 3 on Page 85 of the August issue, Packs 4 and 5 on Page 91 of this issue.

Please send me:

No.	
☐ *Beeb Body Building Pack 1*	£.....
☐ *Beeb Body Building Pack 2*	£.....
☐ *Beeb Body Building Pack 3*	£.....
☐ *Beeb Body Building Pack 4*	£.....
☐ *Beeb Body Building Pack 5*	£.....
Total cost	£.....
**Plus post and packing*	*£1.00*
Total	______

**Postage and packing FREE if more than one pack is ordered.*

Name ....

Address ....

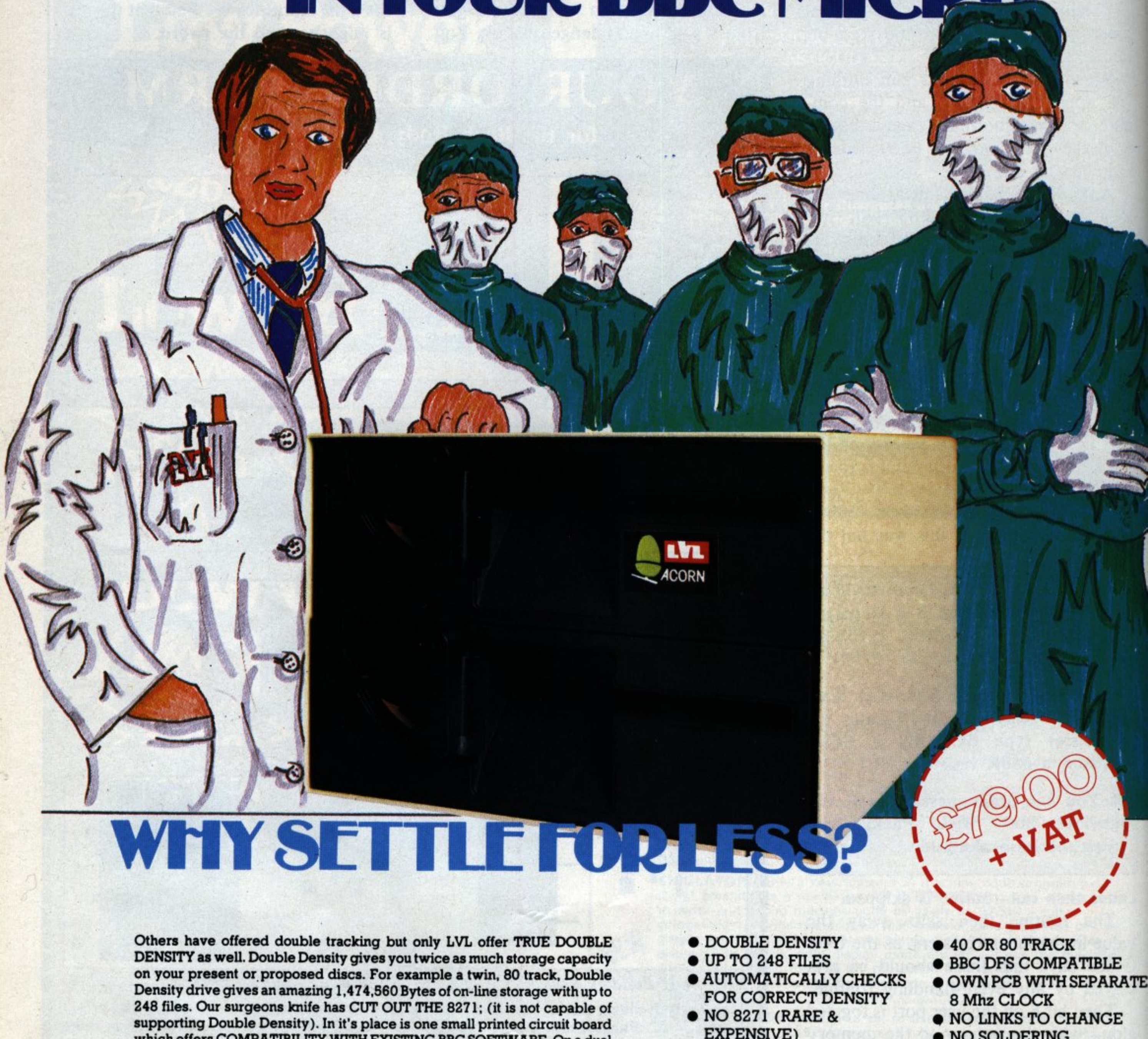
....

....

POST TO: BBC Packs, Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Please allow 28 days for delivery

WE HAVE THE TECHNOLOGY TO IMPLANT DOUBLE DENSITY IN YOUR BBC MICRO



WHY SETTLE FOR LESS?

£79-00 + VAT

Others have offered double tracking but only LVL offer TRUE DOUBLE DENSITY as well. Double Density gives you twice as much storage capacity on your present or proposed discs. For example a twin, 80 track, Double Density drive gives an amazing 1,474,560 Bytes of on-line storage with up to 248 files. Our surgeons knife has CUT OUT THE 8271; (it is not capable of supporting Double Density). In it's place is one small printed circuit board which offers COMPATIBILITY WITH EXISTING BBC SOFTWARE. On a dual drive it is simplicity itself to copy existing software from single density to double density.

On the PCB is a new disc controller with support circuitry providing a much improved decoding. This drastically reduces read errors by using a phased locked loop data separater, which is superior to the standard window circuit.

Fitting the controller does not need a surgeon either, the PCB simply plugs into the socket vacated by the 8271 and whilst the DFS EPROM lives in the normal position there is no soldering to do, or links to change. Your BBC micro will now recognise the media density in the drive, and tell you if it is correct. You may define what density you require, the number of tracks you want, and which sides of the disc to use. The device gives complete flexibility and comes with all utilities provided.

- DOUBLE DENSITY
- UP TO 248 FILES
- AUTOMATICALLY CHECKS FOR CORRECT DENSITY
- NO 8271 (RARE & EXPENSIVE)
- SIMPLE TO FIT
- UTILITIES PROVIDED
- DEFAULTS TO SINGLE DENSITY ON POWER UP
- 40 OR 80 TRACK
- BBC DFS COMPATIBLE
- OWN PCB WITH SEPARATE 8 Mhz CLOCK
- NO LINKS TO CHANGE
- NO SOLDERING
- USER DEFINABLE DENSITY
- SINGLE OR DOUBLE SIDED

WE HAVE THE TECHNOLOGY FOR YOU TO IMPLANT DOUBLE DENSITY.

LVL

Scientific House,
Bridge St, Sandiacre,
Nottingham,
Tel: 0602 394000

THERE'S AN LVL DEALER NEAR YOU ...

AVON

CCE Europe Ltd, Yate, Bristol. 0454 321088

Software Plus, Bath. 0225 61676

Absolute Sound & Video, Clifton, Bristol. 0272 24975

BUCKINGHAMSHIRE

Hi-Vu Electronics, Milton Keynes. 0908 312808

A. L. Wheeler Ltd., Great Missenden. 02406 2560

Tarace Ltd., Wendover. 0296 623915

CHESHIRE

Oakleaf Computers, Chester. 0244 310099

CUMBRIA

Barrow Computer Centre, Barrow in Furness. 0229 38353

Ace Computers, Kendal. 0539 25728

The Computer Shop, Carlisle. 076881 381

DERBYSHIRE

FAW Electronics Ltd., Chesterfield. 0246 33632

First Byte Computers, Derby. 0332 365280

Gordon Harwood, Alfreton. 0773 832078

Graves, Ilkeston. 0602 325478

DORSET

Classic Computers, Bournemouth. 0202 23456

ESSEX

ACL Radio Services Ltd., Grays. 0375 7983

GLOUCESTER

Absolute Sounds & Video, Cheltenham. 0242 583960

GREATER MANCHESTER

C-Tech Software, Hyde. 061 366 8223

Computer City Widnes. 051 420 3333

Fairhurst Instrument Ltd., Wilmslow. 0625 525694

Lomax Ltd., Manchester. 061 832 6167

HEREFORD

B.F. Kempsom, Hereford. 0432 3480

K.A. de Cobain, Goole. 0405 2366

HUMBERSIDE

Computer Facilities, Scunthorpe. 0724 863167

KENT

Kent Micro Computer Ltd., Maidstone. 0622 52784

LANCASHIRE

The Alamine Company, Colne. 0282 52784

J. Lambert (Radio) Ltd., Burnley. 0282 71459

Home & Business Computers Ltd., Oldham. 061 633 1607

I.M.O. COMPUTER Centre, Burnley. 0282 54299

P.V. Microcomputer Centre, Accrington. 0254 36521

Wildings Phocto Ltd., Wigan. 0942 44382/39682

LEICESTER

G.W. Gowling Ltd., Leicester. 0533 553232/542730

Percy Lord & Son Ltd., Wigston. 0533 785033

R.H. Murcott Ltd., Loughborough. 0509 214444

LINCOLSHIRE

Greens of Gainsborough, Gainsborough. 0427 5101/4

Oakleaf Computers Ltd., Grantham. 0476 76994

Peter Rhodes, Market Rasen. 0673 842361

LONDON

R. A. Bailey Ltd., Sydenham. 01 693 1818

Dondene Ltd., London. 01 723 1008

Paul Electrical, London. 01 542 6546

Canonbury Radio, Islington. 01 226 9392

Electro-Leisure, London. 01 727 0511

Off Records, London. 01 223 7730

MERSEYSIDE

Tisdalls, Newton-Le-Willows. 092 52 5577

Thornguard Ltd., Heswall. 051 342 7516

NORFOLK

Adams & Dack (B. B. Adams) Ltd., Norwich. 0603 22129/24813

Bennetts of Dereham, Dereham. 0362 2488

NORTHUMBERLAND

George Storey, Morpeth. 0670 55239

Tom Newton & Sons, Seahouses. 0665 720307

NOTTINGHAMSHIRE

Basic Business Systems, West Bridgeford. 0602 819738

H. N. & L. Fisher (Huthwaite) Ltd., Sutton-in-Ashfield. 0623 53435

S. P. Electronics, Hucknall. 0602 632467

P. R. Hartley, Ruddington. 0602 213492

Mansfield Computers & Electronics, Mansfield. 0623 31202

OXFORD

Rocon Ltd., Abingdon. 0235 24206

Absolute Sound & Video, Headington. 0865 60844

SALOP

Medlicott Bros., Shrewsbury. 0743 3060

Vermillion, Telford. 0952 582995

SUFFOLK

Emery & Co., Bungay. 0986 2141

C. E. Matthews & Co., Ipswich. 0473 215666

STAFFS

Gordon Foster, Lichfield. 05432 22341

Kirklands, Stoke-on-Trent. 0782 412511

John Bagnall Ltd., Stafford. 0785 3420

Computerama, Stafford. 0785 41899

SURREY

Haslemere Computers, Haslemere. 0428 54428

Mr. Cad, Croydon. 01 684 8282

Minichip Ltd., Walton on Thames. 09322 42777

Statacom Ltd., Sutton. 01 661 2266

Visionstore Ltd., Kingston. 01 546 8974

SUSSEX

C. J. E. Microcomputers, Rustington. 09062 6647

Microcentre Ltd., Bognor Regis. 0243 827779

WARWICKSHIRE

Carvell of Rugby, Rugby. 0788 65275

WEST MIDLANDS

Richard Morris (Electrical) Ltd., Warley. 021 429 1161

J.B.C. Microservices, Coventry. 0203 73813

Quality Radio & TV Company, Birmingham. 021 430 5423

D.F. Gibbs Ltd., Coventry. 0203 87432

WILTSHIRE

Wiltshire Microcentre, Swindon. 0793 612299

Absolute Sounds & Video, Swindon. 0793 38222

WORCESTERSHIRE

Spurtree Data, Boraston. 0584 810757

Phoenix Data Systems Ltd., Great Malvern. 06845 68478

YORKS

RDK Business Systems, Wakefield. 0924 381501

Eltec Microcomputers, Bradford. 0274 491373/2

Pennine Computers Ltd., Halifax. 0422 41719

Arthur Yates Ltd., Ripon. 0765 2737

ISLE OF WIGHT

Excell of Bembridge, Bembridge. 098 387 2578

WALES

Aberdata, Ystrad Meurig. 0970 615522

Bucon Ltd., Swansea. 0792 467980

SIR Computers, Cardiff. 0222 759015

SCOTLAND

C. Bruce Miller, Aberdeen. 0244 632211

Computer Services, Glenrothers, Fife. 0592 773710

Ghraham Begg Ltd., Caithness. 0955 4777

Commscot, Glasgow. 041 226 4878

W. M. Coupar, Blairgowrie. 0250 2436

Service Centre, Greenock. 0475 20228

Ian Hutchinson (Leven) Ltd., Leven. 0333 23870

J. H. Donald Ltd., Hurlford. 0563 26477

HOLLAND

Radio Rotor BV, Amsterdam. 010 31 20 125759

IRELAND

The Big Byte Shop, Dublin.

Everyman Computer Services, Ballymoney. Co. Antrim. 026 56 62658

McLaughlin Electronics, Londonderry. 0504 65002

JERSEY

Mega Ltd., St. Helier. 0534 72263

ORKNEY

Orkney Television Enterprise, Kirkwell & Stromness. 0856 2613. 0856 850555

To: Leasalink Viewdata Ltd Scientific House, Bridge Street, Sandiacre, Nottingham NG10 5BA

Please send me

__________ Double Density kit(s) at £90.85 (inc. VAT)

I enclose a Cheque For: £__________ Please Debit My Access/Barclaycard

No ┕┸┸┸┸┸┸┸┸┸┸┸┸┸┸┸┙

Name: __________

Address: __________

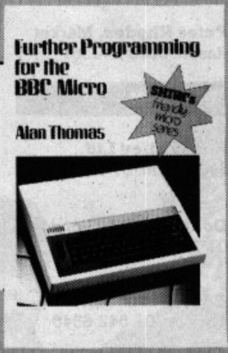
Post Code: __________ Day time Tel No: __________

BBC MICRO BOOKSHOP

Easy Programming for the BBC Micro
Eric Deeson
Shiva's friendly micro series

Probably the best elementary BBC Basic text. An exceptionally readable book which more than lives up to its title.

£6.95


Further Programming for the BBC Micro
Alan Thomas
Shiva's friendly micro series

An easy-to-follow, step-by-step guide to more advanced BBC Basic, following on from Easy Programming for the BBC Micro.

£6.95

With 36 fun programs for the BBC Micro, this is exceptional value for money. It also gives many ideas for future projects.

£4.75

The Book of Listings
Fun Programs for the BBC Microcomputer
Tim Hartnell and Jeremy Ruston

ASSEMBLY LANGUAGE PROGRAMMING for the BBC MICROCOMPUTER
Ian Birnbaum

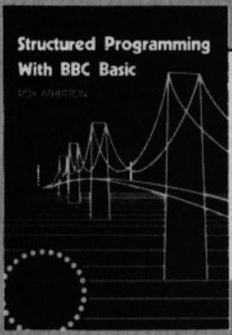
One of the best assembly language books ever written. Comprehensive, and specially compiled for the BBC Micro.

£9.95

The Computer Games Series
GAMES FOR YOUR BBC MICRO

Twenty good games listings plus hints on better programming and a comprehensive glossary. Excellent value.

£3.55

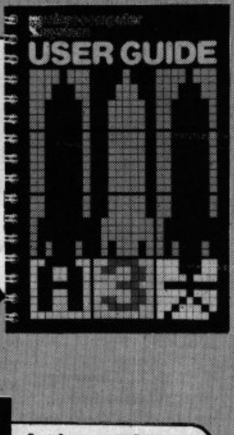

Structured Programming With BBC Basic

A clearly written manual on good Basic programming and problem solving. This book could become the standard work.

£7.50

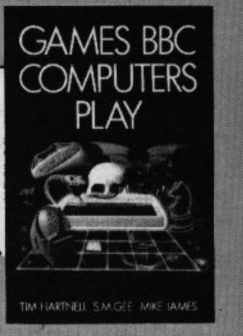
The indispensible aid for anyone using the BBC Micro. Its 518 pages of solid facts include a vital 315-page reference section.

£10.95



Forty quality games. A varied selection ensures something for everyone.

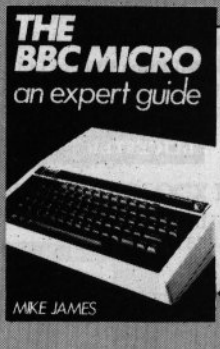
£7.95


GAMES BBC COMPUTERS PLAY
TIM HARTNELL S.M.GEE MIKE JAMES

Programming the BBC Micro
Peter Williams
Newnes Microcomputer Books

A thorough, thoughtful, though high-paced review of elementary BBC lore. Includes topics such as the disc system and interfacing.

£7.50


THE BBC MICRO an expert guide
MIKE JAMES

An intelligent, information manual on the workings of the BBC Micro. Recommended reading for anyone beyond the beginner's stage.

£7.95

ORDER FORM

All prices include postage and packing

Please supply the following book(s)

Please enter number required in box

		£
☐ Let Your BBC Micro Teach You to Program	£7.45	....
☐ Programming the BBC Micro	£7.50	....
☐ Easy Programming for the BBC Micro	£6.95	....
☐ Basic Programming on the BBC Micro	£6.95	....
☐ 30 Hour Basic	£6.50	....
☐ BBC Micro User Guide	£10.95	....
☐ Assembly Language Programming for the BBC Microcomputer	£9.95	....
☐ The BBC Micro Revealed	£8.95	....
☐ The Book of Listings	£4.75	....
☐ 30+ Programs for the BBC Microcomputer	£5.95	....
☐ Further Programming for the BBC Micro	£6.95	....
☐ Games for your BBC Micro	£3.55	....
☐ Games BBC Computers Play	£7.95	....
☐ Structured Programming with BBC Basic	£7.50	....
☐ The BBC Micro: An expert guide	£7.95	....

I enclose my cheque/P.O. for ________

Cheques payable to Database Publications

Name ....

Address ....

....

....

Post to: Database Publications,
Europa House, 68 Chester Road,
Hazel Grove, Stockport SK7 5NY.

These special prices apply to UK readers only. Prices to overseas readers are available on request.

From Page 63

THE game may be a little too fast for the less dextrous and altering line 940 as indicated below should cure the speed handicap for all but the most pedestrian user:

940 IF BY% -RND (500)-800 A% = 0: B% = 0

The 800 was originally 300, and this can be changed to suit individual needs.

```
 10 REM ******************
 20 REM * ROBIN + MARIAN *
 30 REM * GAME DESIGN BY *
 40 REM * PETE BIBBY *
 50 REM * WRITTEN BY *
 60 REM * MARK SMIDDY *
 70 REM * COPYRIGHT (C) *
 80 REM * MICRO USER *
 90 REM * 1983 *
100 REM ******************
110 PROCinit
120 ON ERROR PROCerror
130 MODE 7
140 SC%=0
150 *FX12.0
160 *FX15.1
170 PROCtitles
180 REPEAT
190 *FX12.0
200 *FX15.1
210 MODE 7
220 PROCheader
230 PROChiscores
240 PROCdisplay
250 PRINT TAB(0.24)"RETURN FOR INSTRU
    CTIONS.SPACE TO PLAY";
    :REPEAT G=GET
    :UNTIL G=32 OR G=13
260 IF G=13PROCtitles
270 MAN%=4
    :SC%=0
    :P%=1
280 REPEAT
290 MODE 2
300 VDU 23;8202;0;0;0;
310 PROCsetup
320 PROCdrawcastle
330 IF P%=1 VDU 19.8.6;0;
340 IF P%=2 VDU 19.8.4;0;
350 IF P%=3 VDU 19.8.0;0;
360 IF P%>=4VDU 19.8.6;0;
370 REPEAT
380 *FX15.1
390 PROCmoverobin
400 IF H% PROCshoot
410 IF NOT A%PROCbad_guys
420 IF B% PROCbomb
430 IF BX%=X% AND BY%=Y%+4 D%=TRUE
440 IF J%=W% AND Z%=L%+4 PROCthemhit
450 UNTIL D% OR G%
460 IF D% PROCdead
470 UNTIL MAN%=0
480 PROCend
490 UNTIL FALSE
500 DEF PROCmoverobin
510 T%=T%-P%
    :IF T%<=0 D%=TRUE
    :ENDPROC
520 COLOUR 132
    :COLOUR 3
    :PRINT TAB(10.31);T%;"      ";
530 K%=INKEY (0)
    :IF K%=-1ENDPROC
540 IF K%=32 AND NOT H%PROCfire
    :ENDPROC
550 IF K%=46 X%=X%-V%
    :NCAR%=1
560 IF K%=47 X%=X%+V%
    :NCAR%=0
570 IF K%=65 AND (POINT(X%.Y%+4)=0
    OR POINT(X%.Y%+4)=8 OR POINT(X%.Y
    %+4)=7) Y%=Y%+32
    :NCAR%=2
    :V%=0
580 IF K%=90 Y%=Y%-32
    :NCAR%=2
590 IF POINT(X%.Y%+4)=0 V%=64
    :
    ELSE V%=0
600 IF X%<=0 X%=0
    ELSE IF X%>=1216 X%=1216
610 IF Y%<=92 Y%=92
620 PROCplotrobin(X%,Y%.NCAR%)
630 IF POINT(X%.Y%+4)=8 PROCwin
640 ENDPROC
650 DEF PROCplotrobin(X%.Y%.NCAR%)
660 VDU 5
    :GCOL 3.3
670 MOVE X%.Y%
    :VDU 231+NCAR%
    :MOVE OX%.OY%
    :VDU 231+OCAR%
    :SOUND &10.-12.6.1
    :OX%=X%
    :OY%=Y%
    :OCAR%=NCAR%
```

This listing was produced using a special formatter which breaks one program line over several lines of listing. When entering a line don't press Return until you come to the next line number. Full details of the formatter are in the July issue of The Micro User.

```
    :VDU 4
680 ENDPROC
690 DEF PROCbad_guys
700 RESTORE
710 MAX%=RND (24)
    :FOR O%=1 TO MAX%
    :READ W%.Z%
    :NEXT
720 PROCplot_baddy
730 ENDPROC
740 DEF PROCplot_baddy
750 SOUND &12,2,200.255
760 GCOL 3.6
    :VDU 5
    :MOVE AX%.AY%+28
    :VDU 229
    :MOVE W%.Z%+28
    :VDU 229
    :GCOL 3.1
    :MOVE W%.Z%
    :VDU 230.4
770 AX%=W%
    :AY%=Z%
    :BX%=W%
    :BY%=Z%
    :OBX%=W%
    :OBY%=Z%
    :A%=TRUE
    :B%=TRUE
780 ENDPROC
790 DEF PROCfire
800 J%=X%
    :R%=X%
    :S%=Y%
    :L%=Y%
    :H%=-1
    :VDU 5
    :GCOL 3.6
    :MOVE X%.Y%
    :VDU 230
    :
    :PROCshoot
    :SOUND &13.3.200.50
    :Q%=TRUE
810 ENDPROC
820 DEF PROCshoot
830 GCOL 3.6
    :VDU 5
    :MOVE R%.S%
    :VDU 230
    :L%=L%+32
840 IF L%>640 H%=0
    :SOUND &10.1.4.40
    :ENDPROC
850 VDU 5
    :MOVE J%.L%
    :VDU 230
860 R%=J%
```

BBC

Your Official Thames Valley Dealer

Contact us for all your BBC Microcomputer requirements.

BBC Model B in stock now!

We supply:

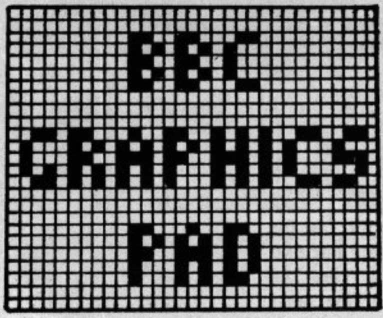
Service, Support, Demonstrations, Advice, Sales.

Full range of Hardware and Software available from:

P.J. MICROSYSTEMS

14 Wood End Crowthorne, Berks.
RG11 6DQ.
Telephone: (0344) 772351

THE EASY WAY TO PLAN YOUR GRAPHICS



20 Sheets for Mode 7
10 Sheets for Mode 0
10 Sheets for Mode 1/4
10 Sheets for Mode 2/5

★

Tab Positions.
Plot Co-ordinates.
Space for Listings.

★

£2.50 each

I.Q. COMPUTER PRODUCTS
P.O. BOX 81,
SWINDON, WILTSHIRE.

J.P. MAGNETICS LIMITED

HAVING TROUBLE OBTAINING QUALITY COMPUTER LENGTH CASSETTES?

WE CAN SOLVE YOUR PROBLEM

10 x C15 for £4.50 + 50p P&P

(CASH WITH ORDER)

We are specialists in the supply of bulk custom wound audio/computer cassettes.

Trade Enquiries Welcome

Competitive Rates – Price List Available.

Contact us now: (0274) 731651

Unit 4, - 7 Mary Street, Bradford, BD4 8SW.

PROFIT
Community

COMMUNITY

Community falls into the category of strategic games. You take the role of Lord of the Manor and must deal with a wide range of hardships from starvation to murder at the hands of a ruthless bank manager. The program is based around the classic "Kingdom" game, including four types of crop, four types of animal, six possible weather conditions, a market and numerous natural (and unnatural) disasters.

Model B **Price £6.90**

ULTIMA-FILE

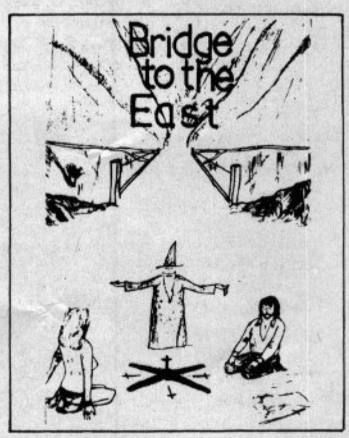
This program is an invaluable aid to your collection whether your interests lie at home or in the office. ULTIMA-FILE will handle your current filing system. Useful for keeping records of anything from telephone numbers to stock lists. Includes an alphabetical sort.

A or B Models **Price £7.50**

BRIDGE TO THE EAST

A new experience in graphical adventure games. It combines the excitement of an arcade game with the subtlety of an intriguing adventure. You take the part of a wizard who must protect a band of would-be heroes, as they journey to save the land by restoring the Crystals of Power. All the action takes place in real time in exquisite scenery interspersed with cunning riddles and brain-teasing problems.

Model B **Price £8.05**



MINER

In 'Miner' you are trapped on an alien planet called 'Rhondahl'. Your ship has been rendered inoperative and you require a 'Hornfelse' crystal to power the hyper drive. Without the crystal you cannot attain enough power to overcome the planet's gravitational field.

The planet is formed of 'Kyper-Marl' with mountains of 'Granite'. Your tools can cope with the 'Kyper-Marl', but not the 'Granite' and you must venture into the cave system in search of the crystal. Beware, however, the indigenous cavemen who dwell in these subterranean vaults and the explosives left by previous unsuccessful and very dead end expeditions.

Model B **Price £6.90**

LIFE

Conway's classic game reproduced faithfully on the BBC MICRO.

Model A **Price £4.75**

Write to: **IXION SOFTWARE**

10, The Crescent, Lympsham, Weston-Super-Mare, Somerset BS24 0BH.

Cheques and Postal Orders payable to 'IXION SOFTWARE'. Allow 21 days for delivery.

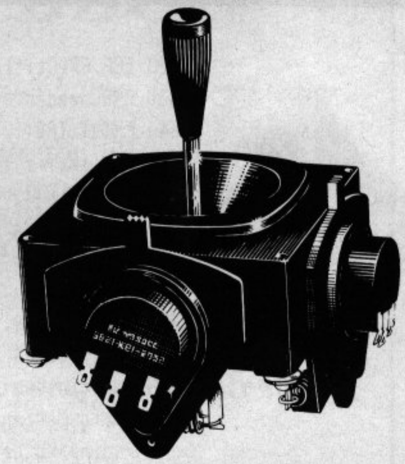
(All prices include VAT & Postage and Packing)

From Page 95

```
    :S%=L%
870 ENDPROC
880 DEF PROCbomb
890 VDU 5
    :GCOL 3.1
    :MOVE OBX%.OBY%
    :VDU 230
900 BY%=BY%-32
910 MOVE BX%.BY%
    :VDU 230,4
920 OBX%=BX%
    :OBY%=BY%
930 IF BY%<-200 SOUND &12.0,0,0
940 IF BY%<-RND (500)-300A%=0
    :B%=0
950 ENDPROC
960 DEF PROCthemhit
970 A%=FALSE
    :B%=FALSE
980 VDU 5
    :GCOL 3.1
    :MOVE BX%.BY%
    :VDU 230.4
990 SOUND 0.1.6.20
    :SOUND &11.1,125.20
    :SOUND &12.3.204.50
1000 FOR M%=0TO 2
    :FOR N%=0TO 20
    :VDU 19.6.RND (8);0;
    :NEXT .
    :VDU 19.6.6;0:
1010 COLOUR 136
    :SC%=SC%+20
    :PRINT TAB(11.0):SC%
1020 COLOUR 130
    :COLOUR 7
    :PRINT TAB(19.E%);
    :VDU 234
    :E%=E%+1
    :IF E%>=27 E%=26
1030 ENDPROC
1040 DEF PROCwin
1050 REPEAT
1060 VDU 5
    :GCOL 0.1
    :MOVE 1184,928
    :VDU 239,4
1070 T%=T%-10
1080 SOUND &11.3,200.50
1090 SC%=SC%+10
    :PRINT TAB(11.0);SC%
1100 *FX12,0
1110 UNTIL T%<=10
1120 G%=TRUE
    :P%=P%+1
    :IF P%>4P%=4
1130 ENDPROC
1140 DEF PROCdead
1150 SOUND &11,0,0,0
    :SOUND &12,0,0.0
    :NCAR%=4
    :PROCplotrobin(X%,Y%,NCAR%)
1160 FOR M%=0TO 10
    :SOUND &13,3,RND (255).50
    :VDU 19,3,RND (6);0:
    :FOR N=0TO 150
    :NEXT .
    :VDU 19.3,3;0;
    :MAN%=MAN%-1
1170 ENDPROC
1180 DEF PROCend
1190 PRINT TAB(6,5):"THE END"
1200 FOR M%=0TO 15
    :SOUND &13.3.RND (255).50
    :SOUND &12.2.RND (255).50
    :VDU 19.3.RND (6);0:
    :VDU 19.2.RND (6);0:
    :FOR N=0TO 150
    :NEXT .
    :VDU 19.3,3;0:
    :VDU 19.2.2;0:
    :SOUND &12.0.0.0
1210 ENDPROC
1220 DEF PROChiscores
1230 N=0
    :REPEAT N=N+1
1240 UNTIL SC%>score(N) OR N=21
1250 IF N<21 FOR N1=20 TO N STEP -1
    :score(N1)=score(N1-1)
    :name$(N1)=name$(N1-1)
    :NEXT
1260 IF N<21 score(N)=SC%
    :REPEAT
    :CLS
    :PROCheader
    :PRINT TAB(3.10);"YOUR SCORE
     IS IN THE TOP 20";TAB(6.12);
    "PLEASE ENTER YOUR NAME"
    :INPUT N$
    :UNTIL LEN (N$)<10
    :name$(N)=N$
1270 ENDPROC
1280 DEF PROCdisplay
1290 PROCheader
1300 FOR N=1TO 20
    :PRINT TAB(10.N+3);N;CHR$ (128+
    RND (6));TAB(13.N+3);name$(N);
    TAB(25,N+3);score(N);
    :NEXT
1310 ENDPROC
1320 DEF PROCtitles
1330 PROCheader
1340 PRINT TAB(12.5);"A   =   UP":
    TAB(12,7);"Z   =   DOWN";
    TAB(12.9);">   =   LEFT";
    TAB(12,11);"?   =   RIGHT";
    TAB(11.13);"SPC  = ";CHR$ (136):
    CHR$ (129):"FIRE";
1350 PRINT TAB(0.15);"The";CHR$ (129);
    "EVIL";CHR$ (135);"Sheriff of
     Nottingham has"'"captured poor
     Maid Marian. You as Robin are
     going to get her back";
1360 PRINT ". A local"'"Warlock has
     lent a hand. but he's not"
    "too good at the job. When you
     shoot a"'"baddie a piece of
     ladder will appear."'"But if
     you die the whole lot goes."
    "Come back Merlin -- all is forgi
    ven!"
1370 PROCwait
1380 PROCheader
1390 PRINT '"Before you rush off.
     don't forget to"'"finish the
     level. You must climb the"
    "Warlock's ladder (OH NO!) and
     rescue"'"Maid Marian from the
     Sheriff's clutches"'"...Doing
     this adds any remaining bonus"
    "to your score.";
1400 PRINT " The rest is simple."
    "You just start all over again.
     Only" "you've got less time
     to do it."
1410 PROCwait
1420 ENDPROC
1430 DEF PROCwait
1440 PRINT TAB(0,24);"PRESS ANY KEY
     TO CONTINUE";
    :G=GET
1450 ENDPROC
1460 DEF PROCheader
1470 CLS
1480 PRINT TAB(0,0);DH$;R$;BR$;Y$;
    TAB(10.0);"ROBIN AND MARIAN":
    TAB(0.1);DH$;R$;BR$;Y$;TAB(10,1):
    "ROBIN AND MARIAN";TAB(8.3);
    CHR$ (136);CHR$ (130);"HI:";name$
    (1);TAB(25,3);score(1)
1490 ENDPROC
1500 DEF PROCdrawcastle
1510 PROCsky_moat
1520 PROCtower
1530 PROCcastle
1540 PROCwindows
1550 PROCbattlement
1560 PROCletters
```

This listing is included in this month's cassette tape offer. See order form on Page 77.

PRECISION DUAL AXIS CONTROL STICK



Suitable for use with Computers, Robotics, Machine tools.

Widely used by Government departments and industry.

SUPER SMOOTH PRECISE ACTION, SEPARATE FINE TRIM ADJUSTMENT, ACCURATE CENTRING, LONG LIFE MOULDED NYLON PARTS

Available in kit form – easily assembled.

Standard version – Carbon track Pots. 1 off **£8.50** P & P 75p

De luxe version – conductive plastic film pots. 1 off **£12.80** P & P 75p

Send SAE for full details of sticks and servos suitable for Robotics.

OEM and Trade Enquiries invited

VISA

SKYLEADER

Unit 8, Airport House, Purley Way, Croydon,
Surrey, CR0 0XZ. Tel: 01-686 6688

THE BBC MICRO SOUND SYSTEM
MICROVOC
As supplied to Schools & Colleges

SYSTEM INCLUDES:

Speakers, Volume control, jack sockets and all connections (assembled).

Easily fitted with no drilling, soldering or cabinet modifications **£23.00** inc VAT and p & p

MUSIC SOFTWARE now available.

Royalties paid for Musical and Educational Software.

MICRO-ADVENT
Ashlyn House, 113 Writtle Road, Chelmsford, Essex.
Tel: 0245 59708

Norsoft

Software for the BBC 32K and Spectrum

I.J.K. GEMINI

Send S.A.E. for details

91 Roundwood Road, Northenden,
Manchester M22 4AD.

B.B.C. ACORN COMPUTERS IN LEICESTER

Specialists on hardware and software

* Fully authorised ACORN-BBC Dealer *

** Complete after sales service – repairs and maintenance contracts**

★ ANALYSE DISC ★
- recover information from damaged discs.
- copy protected discs.
- protect your own valuable software.
- full documentation giving details of disc organisation in addition to how to use ANALYSE.

£15.00 inc. VAT and p&p

★ SCREEN DUMP ROM ★
- copy any screen in any mode.
- compatible with MX80, FX80, RX80, CP80, GP100, GP250, etc.
- fast machine code dumps.
- screen magnification factors x1, x2 or x4.
- plugs into page ROM socket.

£15.00 inc. VAT and p&p

Plus four utility programs including disassembler, merge and repeat programs **£18.00**

BBC A & B MICROCOMPUTERS IN STOCK

DAC Disc Drives	**£212.00** inc. VAT
Disc Interface Kits	**£92.00** inc. VAT
A to B Upgrade Kits	**£66.70** inc. VAT

We have a wide selection of Printers including EPSON FX80, RX80, Shinwa CTI CP80, Seikosha GP100, GP250 etc. in stock prices from £200.

14" Colour Monitors	**£269.00**
Games Joysticks	**£25.00**
Data Cassette Recorders	**£39.00**
12" Monochrome Monitor	**£100.00**
BBC Paddles	**£14.00**
Shinwa CP80	**£318.00** inc. VAT & carriage
Epson FX80	**£429.00** inc. VAT & carriage
Epson RX80	**£318.00** inc. VAT & carriage

Most of the best software in stock including Acornsoft, Programpower, Bugbyte, Computer Concepts, Superior Software, Nibblesoft, Fisher-Marriott etc.

A wide selection of Books, Magazines and accessories.

See a demonstration of the PLS Digitiser – **£120.00**

PHARMACISTS – call for a demonstration of our high-speed, comprehensive label printing system.

All our prices include VAT but please add £5.00 postage for any major item (computers, monitors, discs etc.)

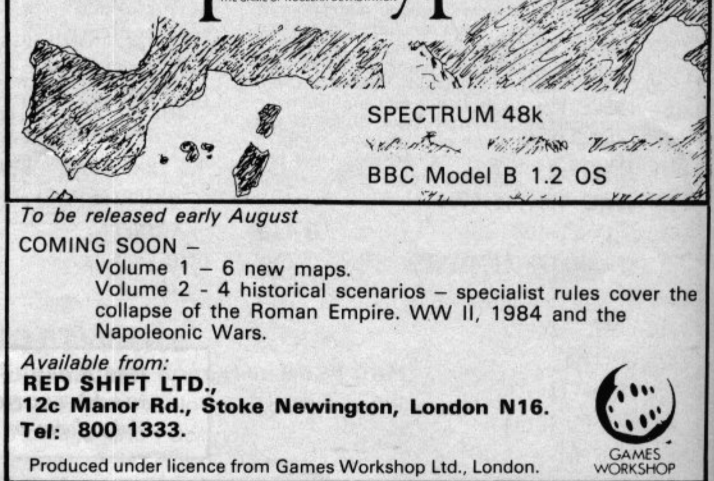
Please call and visit our new showrooms at:-

D.A. COMPUTERS LTD.,
104 London Road, Leicester.
(2 mins from Railway Station). Closed Mondays
Telephone: (0533) 549407

RED SHIFT

APOCALYPSE

A new concept in computer gaming.
A multi-player game of strategy and diplomacy.
designed to be expanded and manipulated, the game places YOU in POWER. Each game contains four maps. The BBC version is over 68K of program and data and the Spectrum totals over 90K.
PLAY IT BEFORE YOU'RE IN IT!


Apocalypse
THE GAME OF NUCLEAR DEVASTATION

£9.95
inc. VAT
and P&P

SPECTRUM 48k

BBC Model B 1.2 OS

To be released early August

COMING SOON –
Volume 1 – 6 new maps.
Volume 2 - 4 historical scenarios – specialist rules cover the collapse of the Roman Empire. WW II, 1984 and the Napoleonic Wars.

Available from:
RED SHIFT LTD.,
12c Manor Rd., Stoke Newington, London N16.
Tel: 800 1333.

Produced under licence from Games Workshop Ltd., London.

GAMES WORKSHOP

From Page 97

```
1570 PROCdoor
1580 PROCmarian
1590 ENDPROC
1600 DEF PROCtower
1610 LOCAL X%
     :COLOUR 2
1620 FOR X%=0 TO 1
     :PROCtow
1630 NEXT
1640 FOR X%=18 TO 19
     :PROCtow
1650 NEXT
1660 ENDPROC
1670 DEF PROCtow
1680 LOCAL Y%
1690 FOR Y%=5 TO 25
1700 PRINT TAB(X%.Y%);
     :VDU 224
1710 NEXT
1720 ENDPROC
1730 DEF PROCcastle
1740 LOCAL X%.Y%
1750 FOR X%=2 TO 17
1760 FOR Y%=15 TO 25
1770 PRINT TAB(X%.Y%):
     :VDU 224
1780 NEXT .
1790 ENDPROC
1800 DEF PROCbattlement
1810 LOCAL X%
1820 FOR X%=3 TO 16 STEP 3
1830 PRINT TAB(X%.13):
     :VDU 224,224.8.8.10.224.224
1840 NEXT
1850 ENDPROC
1860 DEF PROCwindows
1870 LOCAL X%.Y%
1880 FOR X%=2 TO 18 STEP 3
1890 FOR Y%=16 TO 22 STEP 2
1900 PRINT TAB(X%.Y%):
     :VDU 228
1910 NEXT .
1920 ENDPROC
1930 DEF PROCdoor
1940 COLOUR 3
1950 VDU 5
     :GCOL 0.3
     :MOVE 64.256
     :VDU 225.226.10.8.8.227.227.4
1960 ENDPROC
1970 DEF PROCsky_moat
1980 COLOUR 136
     :VDU 28,0.14.19,0.12
     :COLOUR 132
     :VDU 28.0.31.19.30,12.26
     :COLOUR 128
1990 ENDPROC
2000 DEF PROCletters
2010 COLOUR 132
     :COLOUR 7
     :PRINT TAB(5.0);"SCORE:";SC%;
     TAB(0.0);STRING$(MAN%.CHR$ (
     231)):
     :COLOUR 132
     :COLOUR 7
     :PRINT TAB(4.31);"Bonus:";
2020 ENDPROC
2030 DEF PROCmarian
2040 VDU 5
2050 GCOL 0,1
2060 MOVE 1152.896
     :VDU 236
2070 GCOL 0.7
2080 MOVE 1152.896
     :VDU 237
2090 GCOL 0.4
2100 MOVE 1152.896
     :VDU 238
2110 VDU 4
2120 ENDPROC
2130 DEF PROCsetup
2140 *FX11.1
2150 *FX12.1
2160 D%=FALSE
     :A%=FALSE
     :B%=FALSE
     :G%=FALSE
     :E%=4
     :J%=0
     :L%=0
     :R%=0
     :S%=0
     :W%=0
     :Z%=0
     :T%=2000
     :X%=64
     :Y%=156
     :AX%=-64
     :BX%=-64
     :AY%=0
     :BY%=0
     :OX%=-64
     :OY%=0
     :OCAR%=0
     :NCAR%=1
     :V%=64
2170 IF P%>=4T%=5000
2180 VDU 19,8.6;0:
2190 PROCplotrobin(X%.Y%,NCAR%)
2200 ENDPROC
2210 DEF PROCinit
2220 DH$=CHR$ (141)
     :BR$=CHR$ (157)
     :R$=CHR$ (129)
     :Y$=CHR$ (131)
     :W$=CHR$ (135)
2230 DIM name$(21),score(21)
     :SC%=0
2240 FOR N=1TO 20
     :score(N)=1000
     :name$(N)="Micro User"
     :NEXT
2250 ENVELOPE 1,1,4,-3,5.40,20.30,127,
     -1,0,0,126,0
2260 ENVELOPE 2,128,-1,0,0,200,0,0,127
     ,0,0,0,100,0
2270 ENVELOPE 3,1,20,-20,20,100,100,10
     0,127,-1,0,0,126,0
2280 VDU 23,224,238,238,0,119,119,0,23
     8,238
2290 VDU 23,225,4,15,31,31,63,63,127,1
     27
2300 VDU 23,226,224,248,252,252.254,25
     4,254,255
2310 VDU 23,227,255,255,255,255.255,25
     5,255,255
2320 VDU 23,228.129,129,129,129,129,12
     9,129,129
2330 VDU 23,229,24,24,60,126,126,102,6
     6,0
2340 VDU 23,230,24,24,24,24,24,24,24,24
2350 VDU 23,231,96,108,72,120,64,64,64
     ,96
2360 VDU 23,232,6,54,18,30,2,2,2,6
2370 VDU 23,233,66,90,74,126,24,60,36,
     36
2380 VDU 23,234,129,129,129,255,129,12
     9,129,255
2390 VDU 23,235,16,16,124,16,16,56,126
     ,255
2400 VDU 23,236,24,24,0,0,0,0,0,0
2410 VDU 23,237,0,0,231,0,0,0,36,36
2420 VDU 23,238,0,0,24,24,60,126,0,0
2430 VDU 23,239,34,119,255,254,126,60,
     24,16
2440 ENDPROC
2450 DEF PROCerror
2460 IF ERR =17 ENDPROC
2470 *FX12,0
2480 VDU 22,7,14
2490 REPORT
     :PRINT " IN LINE ";ERL
2500 END
2510 DATA 128,480,128,416,128,352,128,
     288
2520 DATA 320,480,320,416,320,352,320,
     288
2530 DATA 512,480,512,416,512,352,512,
     288
2540 DATA 704,480,704,416,704,352,704,
     288
2550 DATA 896,480,896,416,896,352,896,
     288
2560 DATA 1088,480,1088,416,1088,352,1
     088,288
```

at the sign of the BIG 'M'

MICRO MANAGEMENT

LOW prices

BEST service

New

ELECTRON— son of the BBC

See it at our Stand at the Acorn User Exhibition and thereafter at selected dealers

32K single key entry, programmable cursor, external connections for RS423, A/D convertor, printer port, 1 MHz/tube interface, sideways ROM, full typewriter keyboard, Func key, 7 text/graphics modes, 12 Acornsoft programs available.

- **Britain's No 1 range of products**
- **Check our UK dealer network for your nearest outlet**
- **After sales, speedy service from our own factory and engineers**

It's our aim to provide satisfaction at the sign of the Big 'M'. By providing local distributors, best prices and service, we offer you the most. If you don't see it in our ad., ask your local distributor, or write to our Head Office for full list.

All prices include VAT.

All products normally in stock but to prevent a wasted journey phone your local dealer first before calling.

BBC:

HARDWARE
A full colour 32k ROM computer with 7 text and graphic modes up to 640 × 256 graphics and 80 column text screen, extended microsoft basic, built-in assembler, 1 MHz and tube interface, sideways ROM, RS423, A/D converter.

BBC Model B
PRICE £399

BBC Model B+
Econet
PRICE £446

BBC Model B+
Disk Interface
(fitted)
PRICE £469

BBC Model B+
Disk Interface+
Econet (fitted)
PRICE £516

PROFESSIONAL WORD PROCESSING PACKAGE

BBC computer with disk interface, 100K disk drive, green screen monitor, daisy wheel printer, word processing ROM, complete with all cables, manuals, paper and formatting disk.

PRICE £1299

OVER 1000
OFTWARE TITLES
VAILABLE FOR BBC
SEND FOR LIST

plus
DRAGON COMMODORE
COLOURGENIE SINCLAIR
ATARI MICROPROFESSOR
ORIC LYNX JUPITER

MICRO MANAGEMENT AGENTS

Abergele
Abergele Computer Centre
8 Water St. 0745 826234

Ballymoney
Everyman Computers
Charlotte St. 02656 62116

Birmingham
The Software Centre
80 Hurst St, B5 021 622 2696

Bodmin
Microtest Ltd
18 Normandy Way 0208 3171

Bridgend
Automation Services
31 Wernlys Rd, Penyfai 0656 720959

Bristol
The Model Shop
65 Fairfax St. 0272 23744

Bromley
Datastore
6 Chatterton Rd. 01 460 8991

Cambridge
GCC (Cambridge) Ltd
66 High St, Sawston 0223 835330

Chelmsford
Essex Computer Centre
Moulsham St. 0245 358702

Clacton-on-Sea
Clacton Computer Centre
Pier Avenue 0255 422644

Colchester
Emprise Ltd
58 East St. 0206 865926

Coventry
Coventry Micro Centre
33 Far Gosford St. 0203 58942

Gloucester
The Model Shop
79 Northgate St. 0452 410693

Great Yarmouth
Criterion Computers
12 George St. 0493 53956

Guildford
The Model Shop
23 Swan Lane 0483 39115

Hastings
The Computer Centre
37 Robertson St. 0424 439190

Hay-on-Wye
The Playpen
Market St. 0497 820129

Hemel Hempstead
Faxminster
25 Market Square 0442 55044

Holyhead
P & K Computers
33 Williams St. 0407 50283

Hull
Computer Centre (Humberside)
26 Anlaby Rd. 0482 26297

Ilfracombe
Bits & Bytes
44 Fore St. 0271 62801

Ipswich
Micro Management
32 Princes St. 0473 59181

Kingston-on-Thames
Vision Store
3 Eden Walk 01 549 4900

Lichfield
Fosters
59 Tamworth St. 05432 22341

Liverpool
Beaver Radio
20/22 Whitechapel 051 709 9898

London
Computers of Wigmore St.
87 Wigmore St, W1 01 486 0373

Percivals
85 High St North, East Ham, E6
01 472 8941

Trend Video & Hi Fi
167 High St, E17 01 521 6146

Northampton
Richard Reeves
174 Kettering Rd 0604 33578

Plymouth
FTB Lawson
71 New George St 0752 665363

The Model Shop
11 Old Town St. 0752 21851

Shetland
Tomorrows World
Esplanade, Shetland 0595 2145

Southend-on-Sea
Estuary Software
261 Victoria Ave. 0702 43568

Stevenage
Video City
45/47 Fisher Green Rd. 53808

Stroud
The Model Shop
22 High St. 04536 5920

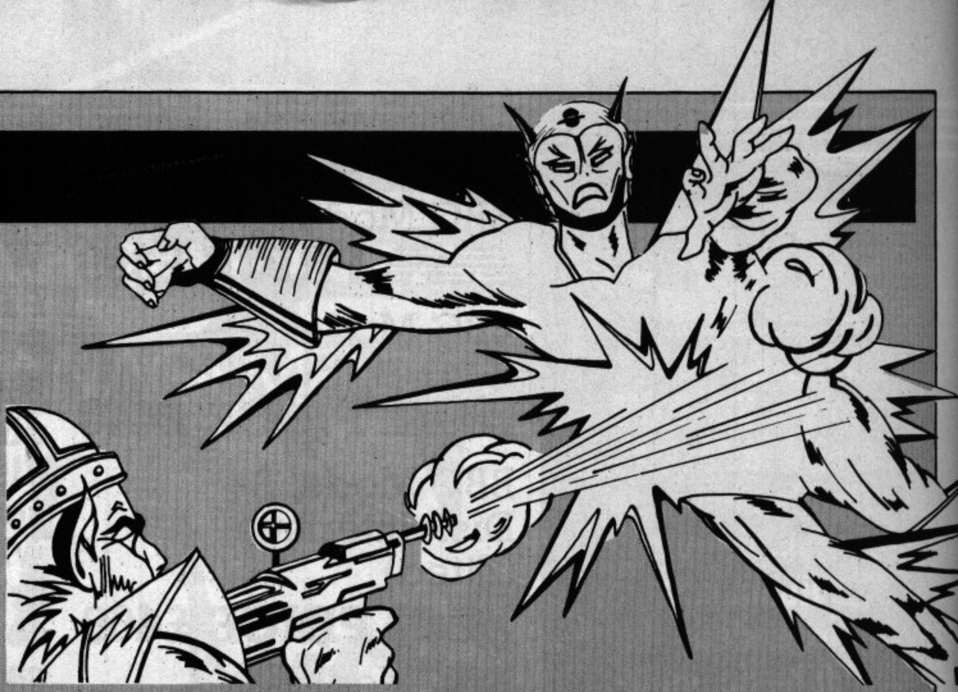
Surbiton
Computasolve
8 Central Parade, St Marks Hill
01 390 5135

Taunton
LA Gray
1 St James St. 0825 72986

West Bromwich
Bell & Jones
39 Queens Square, Sandwell Centre
021 553 0820

Head Office
16 Princes St, Ipswich

Galactic Invaders listing



From Page 53

```
   10 F%=0:DIMA$(5),A%(5),B%(5),D%(5),
Q%(1),R%(1),W%(5)
   20 ENVELOPE1,0,0,0,0,0,0,0,127,-3,-
2,-1,126,63:ENVELOPE2,3,1,1,1,1,1,1,70
,-1,-1,-1,69,0:ENVELOPE3,2,0,50,-30,2,
1,2,127,-4,-2,-1,126,0:ENVELOPE4,1,40,
-5,-10,1,2,5,127,-10,-5,-3,126,0
   30 VDU23,224,24,24,60,126,60,231,23
1,195,23,225,24,24,24,24,24,24,24,24,2
3,226,219,60,90,126,165,60,102,204,23,
227,90,60,90,255,36,60,102,51,23,228,4
1,0,136,18,8,34,16,133,23,229,16,68,16
,2,72,0,33,8
   40 VDU23,230,24,60,60,90,255,60,102
,195,23,231,165,153,189,90,126,60,102,
195,23,232,129,90,60,90,255,189,165,36
,23,233,9,18,36,60,90,126,60,195,23,23
4,144,72,36,60,90,126,60,66
   50 VDU23,235,0,0,0,8,32,138,32,69,2
3,236,0,0,40,2,80,4,32,146,23,237,16,6
8,33,132,16,66,16,73,23,238,119,85,0,0
,0,0,0,0
   60GOSUB700
   61MODE2:BA%=1:SH%=1:S%=0:C%=0:U%=0
   70 A$(0)=" "+CHR$226+" "+CHR$227+"
"+CHR$226+" "+CHR$227+" "+CHR$226+" ":
A$(1)=" "+CHR$231+" "+CHR$232+" "+CHR$
231+" "+CHR$232+" "+CHR$231+" ":A$(2)=
" "+CHR$233+" "+CHR$234+" "+CHR$233+"
"+CHR$234+" "+CHR$233+" "
   80 A$(3)=" "+CHR$227+" "+CHR$226+"
"+CHR$227+" "+CHR$226+" "+CHR$227+" ":
A$(4)=" "+CHR$232+" "+CHR$231+" "+CHR$
232+" "+CHR$231+" "+CHR$232+" ":A$(5)=
" "+CHR$234+" "+CHR$233+" "+CHR$234+"
"+CHR$233+" "+CHR$234+" "
   90 VDU23,1;0;0;0:REM VDU23,8202;0;0
;0 on OS 0.1
  100 Q%(0)=1:Q%(1)=9:R%(0)=RND(6)+4:R
%(1)=RND(6)+4:COLOUR6:PRINTTAB(1,R%(0)
);CHR$225;TAB(9,R%(1));CHR$225
  110 N%=0:FORI%=0TO2:A%(I%)=0:A%(I%+3
)=0:B%(I%)=I%*2+4:B%(I%+3)=I%*2+4:D%(I
%)=1:D%(I%+3)=1:W%(I%)=5:W%(I%+3)=5:CO
LOURI%+1:PRINTTAB(0,B%(I%));A$(I%):NEX
T
  120 J%=0:X%=RND(20)-1:M%=X%:V%=26:CO
LOUR130:COLOUR4:PRINTTAB(0,28);STRING$
(20,CHR$238);STRING$(40," ");:PRINTTAB
(0,29);" SCORE ":COLOUR3:PRINTTAB(7,29
);S%:COLOUR7:PRINTTAB(13,29);STRING$(B
A%,CHR$224+" ");
  130 K%=1:L%=0:Z%=1:G%=0:COLOUR4:COLO
UR128:PRINTTAB(K%,0);CHR$230:COLOUR5:P
RINTTAB(X%,27);CHR$224
  140 H%=0:IFINKEY(-66)THENH%=-1
  150 IFINKEY(-82)THENH%=1
  160 IFJ%=1THEN180
  170 IFINKEY(-74)THENSOUND3,4,75,1:J%
=1
  180 IFX%+H%<0ORX%+H%>19THENH%=0
  190 X%=X%+H%:COLOUR5:PRINTTAB(X%-H%,
27);" ";TAB(X%,27);CHR$224;
  200 IFJ%=1THEN380
  210 M%=M%+H%:COLOUR7:PRINTTAB(M%-H%,
26);" ";TAB(M%,26);CHR$225;
  220 R%(U%)=R%(U%)+1:IFR%(U%)=27THEN4
20
  230 COLOUR6:PRINTTAB(Q%(U%),R%(U%)-1
);" ";TAB(Q%(U%),R%(U%));CHR$225:U%=(U
%+1)MOD2
  240 IFW%(N%)=0THENN%=(N%+1)MOD6:GOTO
240
  250 COLOUR(N%MOD3)+1:A%(N%)=A%(N%)+D
%(N%):PRINTTAB(A%(N%),B%(N%));A$(N%):I
FA%(N%)=0ORA%(N%)=10THEND%(N%)=-D%(N%)
  260 N%=(N%+1)MOD6
  270 IFG%=0THEN340
  280 PRINTTAB(K%,L%);" ";:IFRND(4)>2T
HENK%=K%+RND(3)-2:GOTO300ELSEIFK%<X%TH
ENK%=K%+1
  290 IFK%>X%THENK%=K%-1
  300 IFK%<0THENK%=0
  310 IFK%>19THENK%=19
  320 COLOUR4:L%=L%+1:IFL%=28THEN460
  330 PRINTTAB(K%,L%);CHR$230;:GOTO140
  340 IFRND(39-SH%*3)=1THENSOUND2,2,10
0,1:G%=1:Z%=0:GOTO280
  350 IFK%+Z%<0ORK%+Z%>19THENZ%=-Z%
  360 K%=K%+Z%:COLOUR4:PRINTTAB(K%-Z%,
0);" ";TAB(K%,0);CHR$230;
  370 GOTO140
  380 IFM%=K%ANDV%=L%THEN440ELSEV%=V%-
1:PRINTTAB(M%,V%+1);" ";:IFM%=K%ANDV%=
L%THEN440
  390 IFV%=0THENM%=X%:V%=26:J%=0:GOTO2
20
  400 IFPOINT(M%*64+32,(32-V%)*32-16)<
>0THEN570
  410 COLOUR7:PRINTTAB(M%,V%);CHR$225;
:GOTO220
  420 PRINTTAB(Q%(U%),R%(U%)-1);" ":IF
Q%(U%)=X%THEN480
  430 Q%(U%)=RND(7)+A%(2)+1:R%(U%)=5:U
%=(U%+1)MOD2:GOTO250
  440 SOUND0,1,5,1:SOUND2,0,0,1:COLOUR
3:PRINTTAB(K%,L%);CHR$228:FORI=1TO65:N
EXT:COLOUR1:PRINTTAB(K%,L%);CHR$229:FO
RI=1TO65:NEXT:PRINTTAB(K%,L%);" ";:K%=
1:L%=0:G%=0:Z%=1
  450 M%=X%:V%=26:J%=0:S%=S%+80:COLOUR
3:COLOUR130:PRINTTAB(7,29);S%:COLOUR12
8:GOTO140
  460 PRINTTAB(K%,L%-1);" ";:IFK%=X%TH
EN480
  470 G%=0:K%=1:L%=0:Z%=1:GOTO140
  480 SOUND0,1,5,1:COLOUR3:PRINTTAB(X%
,27);CHR$235;:FORI=1TO100:NEXT:COLOUR5
:PRINTTAB(X%,27);CHR$236;:FORI=1TO100:
NEXT:COLOUR1:PRINTTAB(X%,27);CHR$237;:
FORI=1TO140:NEXT
  490 COLOUR5:PRINTTAB(X%,27);CHR$236;
:FORI=1TO90:NEXT:COLOUR3:PRINTTAB(X%,2
7);CHR$235;:FORI=1TO80:NEXT:PRINTTAB(X
%,27);" ";
  500 FORI=1TO3000:NEXT:BA%=BA%-1:IFBA
%>0THENCLS:GOTO100
  510 IFS%>F%THENF%=S%
  520 COLOUR1:W$="YOU HAVE BEEN":PROCs
low(3,14):W$="DESTROYED BY THE":PROCsl
ow(2,16):W$="GALACTIC INVADERS.":PROCs
low(1,18):COLOUR3:W$="HIGH SCORE "+STR
$(F%):PROCslow(2,21):COLOUR2:W$="ANOTH
ER GO ?":PROCslow(4,24)
  530 *FX15
  540 Q$=GET$:IFQ$="Y"THEN61
  550 IFQ$<>"N"THENVDU7:GOTO540
  560 CLS:END
  570 IFPOINT(M%*64+32,(32-V%)*32-16)=
6THEN140
  580 IFRND(SH%)>1THENJ%=0:M%=X%:V%=26
:GOTO140
```

This listing is included in this month's cassette tape offer. See order form on Page 77.

→

BBC OWNERS

Why not consider the HOBBIT FLOPPY TAPE SYSTEM for your computer?

The HOBBIT gives you all the facilities you would expect from a floppy disc at a fraction of the price.

BRIEF SPECIFICATIONS: Read/Write speed of 7500 BAUD per second ● Capacity: 101K BYTES per CASSETTE ● Average access time 22 seconds ● Up to 120 FILES per CASSETTE ● Completely automatic – no buttons to press ● Fully built, boxed and tested. Just plug in and go ● System can support TWO DRIVES ● Connects to user port ● Works on all operating systems ● No disc interface.

Available from stock **PRICE £135.00 plus VAT**

Manual only £1.50 Postage £3.00

– NOW AVAILABLE –

ZERO MEMORY OPTION

Enables the Hobbit to operate within using any of the Beeb's memory.

Price £25.77 – VAT

For more details contact:

IKON

COMPUTER PRODUCTS

KILN LAKE, LAUGHARNE, CARMARTHEN, DYFED SA33 4QE.

Telephone: (099 421) 515

or
available from
most good Computer Shops

Also available for NASCOM computers **PRICE £120.00 plus VAT**

Access and Barclaycard accepted

STACK LIGHTPEN

NEW RELEASE

BBC

ATARI.....VIC-20.....COMMODORE 64

A beautifully styled, high quality colour light pen for the BBC, with touch controls.

Easy to use....simply hold the LIGHT PEN against the T.V. screen, touch the contacts and the pen is working.
You can produce programs in which the LIGHT PEN places data (alphanumeric or graphical) onto the screen, removes data from the screen or triggers off a series of events or instructions.

Complete with user manual and a free game on cassette (worth £5.75) to get your software library started.

ONLY **£25.00** plus VAT
FREE POSTAGE!!

GRAPHIX-ED

An excellent colour graphics program for your BBC. Easy to use, but be warned, any slight interest in graphics can quickly become an addiction!

- use normal, medium or hi-res graphics
- choose 1, 4 or 16 colours
- controlled by single letter commands
- optional grid display to aid accuracy
- duplicate pictures on other parts of the screen
- picture buffer
- save and recall pictures from cassette
- comprehensive user manual
- quick reference guide to commands

THE COMPLETE PACKAGE COSTS **£19.00** plus VAT

BBC JOYSTICK

Full joystick control — in any direction — and it fires too!!

ONLY **£12.00** plus VAT

HOW TO ORDER

Most computer dealers either stock or can obtain **STACK** products for you, or you may order direct from us.

Packaging and postage is FREE within the U.K., overseas customers please add airmail postage.

Payment may be made by sending a cheque, postal order or by credit card.

24hr answerphone service.

Please send me full details of your BBC products.

Name ____________

Address ____________

____

____

____

STACK

FREEPOST
BOOTLE, MERSEYSIDE L20 0AB

051 933 5511

24hr answerphone

Galactic Invaders listing

From Page 102

```
  590 SOUND0,1,6,1:P%=POINT(M%*64+32,(
32-V%)*32-16):PRINTTAB(M%,V%+1);" ";:C
OLOUR3:PRINTTAB(M%,V%);CHR$228:FORI=1T
045:NEXT
  600 A$(P%-1)=LEFT$(A$(P%-1),M%-A%(P%
-1))+" "+RIGHT$(A$(P%-1),10+A%(P%-1)-M
%):COLOUR1:PRINTTAB(M%,V%);CHR$229:FOR
I=1TO45:NEXT
  610 A$(P%+2)=LEFT$(A$(P%+2),M%-A%(P%
-1))+" "+RIGHT$(A$(P%+2),10+A%(P%-1)-M
%):PRINTTAB(M%,V%);" ";
  620 W%(P%-1)=W%(P%-1)-1:W%(P%+2)=W%(
P%+2)-1
  630 J%=0:M%=X%:V%=26:S%=S%+80-P%*20:
COLOUR3:COLOUR130:PRINTTAB(7,29);S%:CO
LOUR128:C%=C%+1:IFC%=15THENC%=0:SH%=SH
%+1:CLS:IFSH%DIV2<>SH%/2THENSOUND2,3,1
25,1:BA%=BA%+1:GOTO70ELSEIFC%=0THEN70
  640 GOTO140
  650 Q%(0)=RND(7)+A%(2)+1:R%(0)=8
  660 M%=X%:V%=26:J%=0:GOTO140
  670 DEFPROCslow(X%,Y%)
  680 FORI%=1TOLEN(W$):PRINTTAB(X%+I%-
1,Y%);MID$(W$,I%,1):NEXT
  690 ENDPROC
  700 MODE7:PRINTTAB(7);CHR$141;CHR$12
9;"GALACTIC INVADERS":PRINTTAB(7);CHR$
141;CHR$129;"GALACTIC INVADERS"
  710 PRINT'CHR$134;" This is a mixtur
e of two well known"
  720 PRINTCHR$134;"arcade games. The
idea is to destroy"
  730 PRINTCHR$134;"as many of the inv
aders as you can"
  740 PRINTCHR$134;"before your single
 proton base is"
  750 PRINTCHR$134;"obliterated. You m
ove and fire faster"
  760 PRINTCHR$134;"than the invaders,
 but they have a"
  770 PRINTCHR$134;"kamikase ship to h
it you with. Also on"
  780 PRINTCHR$134;"each of the follow
ing sheets there is"
  790 PRINTCHR$134;"less chance of kil
ling an invader in a"
  800 PRINTCHR$134;"single shot."
  810 PRINT'CHR$130;" You move using
A' and 'S' for left"
  820 PRINTCHR$130;"and right and fire
 using 'RETURN'."
  830 PRINT'CHR$133;" You can only fir
e one shot at a time"
  840 PRINTCHR$133;"as your base must
be recharged after"
  850 PRINTCHR$133;"each shot. You can
 fire again when the"
  860 PRINTCHR$133;"missile appears on
 the launcher of"
  870 PRINTCHR$133;"your ship."
  880 PRINT'CHR$131;"PRESS ANY KEY TO
BEGIN YOUR DEFENCE..."
  890 *FX15
  900 Q$=GET$:RETURN
```

★ EASY GRAPHICS ★

Easy Graphics makes the graphics facilities on your BBC micro (32K) easily accessible, even to non-programmers. All commands are entered from the keyboard, and allow you to draw maps, graphs, technical drawings, computer art, even animated pictures. Loads from cassette.

Includes the following features:

★ Flashing cursor can be positioned anywhere on the screen, on/off control, variable speed. ★ Draw and erase lines (all PLOT modes available). ★ Measure distances and angles, find x,y co-ordinates. ★ Draw circles, elipses, arcs and polygons.
★ Fill any shape. ★ Change colour or pallette at any time (GCOL modes available). ★ Easy colour mixing to produce many extra colours and shades. ★ Mode changes at any time (works in modes 0,1,2,4 or 5).
★ Auto repeat, allows any shape or effect to be moved around the screen or repeated. ★ Rubber band – ideal for judging perspective. ★ Write text anywhere on the screen. ★ Alignment grid, useful when composing your picture. ★ Full editing facility, one mistake does not mean you have to start again. ★ Pause and clear screen, allows you to change from one "page" to another. ★ Save on tape and redraw using special program generator. ★ Use to illustrate your own programs.

EASY GRAPHICS is probably the most versatile graphics program on the market. Must be seen to be fully appreciated.

EXCELLENT VALUE AT ONLY £13.50.

Includes demonstration program, program generator (allows you to redraw your pictures) and full instructions.

Write for more details or send cheque/PO to:

HEXAGON SOFTWARE

17, Straits Road, Gornal, Dudley, West Midlands,
DY3 2UR. Tel: (0384) 232992
P&P included.

STAR SOFT

FANTASTIC INTRODUCTORY OFFER!
3 TAPES FOR THE PRICE OF ONE!! £9.95 (inc. VAT + P&P)

Superb colour graphics and sound. Very user friendly. Launched and acclaimed at the **BBC Micro User Show.**

1. **PUB GAMES PACK** – Darts, Dominoes and two Card Games.
2. **PICASSO** – Auto Painting Programs.
3. **MICRO PAINT BOX** – Picture gallery.

Learn elements of structured programming by accessing our large procedures library. Frame our pictures, then list and frame your own.

Available NOW – allow 5 days for delivery. Cheques, PO's payable to:

★ STAR SOFT ★

9, Chatsworth Road, Worsley,
Manchester M28 4NU.
Tel: 061-794 8076

Eltec HOME & BUSINESS TECHNOLOGY computers

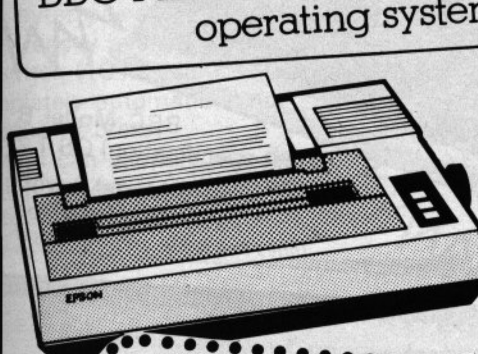
Probably the widest selection of software available by mail order.

All the top manufacturers including **Acorn Soft**, IJK (Sinclair), Superior Software, Bug Byte, Program Power, Hessel, Procyon.

All in Stock
(as long as you're quick)

BBC
MICRO COMPUTERS

BBC MICROCOMPUTERS, with the latest 1.2 operating system Model B **£399**



CASSETTE RECORDERS

BBC
Data Cassette
available from
stock now **£29.90**
incl. cable

SPECIAL

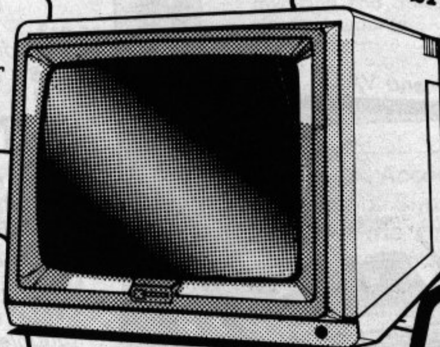
Basic II in stock **£11.50**

PRESTEL

Modem & Software & Lead.
Converts the BBC Micro into a
Prestel/private viewdata receiver.
£175.00 all inclusive.

EPSON

New Epson FX80 F/T III Printer
160 c.p.s. Parallel **£450.00**



Full service for Education

NEW ACORNSOFT GAMES

NOW IN STOCK

Snooker	9.90
Missile Base	9.90
Starship Command	9.90
Countdown To Doom	9.90

TEAC

TEAC 40T/80T
Switchable
double sided
Disc Drive
400K/800K
£658

Microvitec

Microvitec "Cub" Monitor. True
80 Column Definition at a new
low cost from **£459.00**

PROTECTIVE COVERS AND CARRYING CASES

Polyester Cotton Cover	3.97
Soft PVC Cover	4.45
Hard Carrying Case	55.20
Soft Carrying Case	23.00
Cassette leads	4.00

HARDWARE

LIGHT PEN - R.H. Electronics (includes software cassette)	£45.94
NEW SPEECH SYNTHESISER ROM From ACORN	£55.00

Eltec Computers Dept. BBC M. U. (9)
217 Manningham Lane
BRADFORD BD8 7HH. Tel (0274) 722512

Sound Pick-Off Module (simple to fit).	£6.95
BBC Joysticks - pair	£13.00
BEEBSTICK - Fully proportional joystick for computer aided design	£29.75

UTILITY SOFTWARE

THE KEY - Explore the disk environment	£12.95
REPLICA - Allows machine code and basic programs to be up-loaded on to disk	£9.95
GRAFKEY/GRAFDISK - Your entry into the world of computer aided design	£8.95/£12.95
JOYSTICK UTILITY - Converts none joystick programs to work with joysticks	£5.00
BEEBSYNTH - Powerful sound generating program Disk	£10.95
Cassette	£7.95

HIGH QUALITY GAMES - TESTED

Killer Gorilla (Program Power)	£7.99
Road Runner (Superior Software)	£7.50
Candyfloss & Star Trek (IJK)	£6.50
Leapfrog (IJK)	£7.50
Android Attack (Computer Concepts)	£8.95

All above prices include VAT

Carriage £1.00 for item(s) value less than £100.
Carriage £10.00 for orders over £100.

BARCLAYCARD VISA

For full price lists or further details of any products send s.a.e.

Wilmslow Micro

For all your BBC Micro needs

ACCESSORIES

BASF 5¼" Floppy Discs Box of ten
Single Sided, Single Density 40 Track ... **£18.50**
Double Sided, Double Density 80 Track . **£29.95**

VERBATIM HEAD CLEANING KIT **£9.33**

LOCKABLE DISC STORAGE BOXES
Strong, attractive, secure.
Model ACP 35 (holds 35 discs) **£20.00**
Model ACP 70 (holds 70 discs) **£26.00**

LIBRARY BOXES. Holds 10 discs.
Great value at **£1.96**

C12 COMPUTER GRADE BLANK CASSETTES.
Special offer: 11 for **£5.00**

DUST COVERS. Smart durable,
fits BBC and Epson FX80 Printer **£3.25**

JOYSTICKS Fully proportional,
compact, handy size .... Per Pair **£16.50**

BB KEY Simple, effective way of
labelling your function keys **£1.50**

All these prices include P&P and VAT

AT LAST!

A data cassette recorder that perfectly matches the BBC Micro.

Fully compatible with the BBC and specifically designed for data saving and loading, the Pye data cassette recorder (with free power pack and BBC lead) is guaranteed to end your data storage and retrieval problems.

£49.95
inc. P & P

PRINTERS FOR THE BBC MICRO

(Available ex-stock)

CENTRONICS 737-2
Dot matrix 100 cps non graphics **£250.00**

NEW

EPSON RX80
Dot matrix 100 cps graphics **£308.20**

EPSON FX80
Dot matrix 160 cps **£450.00**

SEIKOSHA GP100A
Dot matrix graphics printer 50 cps.............. **£215.00**

SILVER REED & INTERFACE
Letter quality electronic typewriter/printer **£414.00**

Carriage: £7

Phone in your order for the BBC Micro before 12noon and we will despatch same day!

AVAILABLE FOR IMMEDIATE DELIVERY

BBC Model B (latest specification) OS 1.2 **£399***

BBC Model B with Pace Disc Interface **£495***
(fitted free in our own workshops)

* *Carriage £7*

Unbeatable Prices!

Disc Drives for every application

All drives include cable for BBC Micro and full instructions.

2 FREE DISCS WITH EVERY ORDER

SINGLE DRIVES

Total capacity 100K, 40 track, single sided:
CUMANA CS50A Full height **£205**
PACE PSD1 Slimline **£212**
Total capacity 200K, 40 track, double sided:
PACE PSD2 Slimline **£263**
Total capacity 400K, 40/80 track switchable, double sided:
PACE PSD3 Slimline... **£390**

DUAL DRIVES

Total capacity 200K, 40 track, single sided:
CUMANA CD50A Full height **£400**
PACE PDD1 Slimline **£389**
Total capacity 400K, 40 track, double sided:
PACE PDD2 Slimline **£560**
Total capacity 800K, 80/40 track switchable, double sided:
CUMANA CD55M *(Mitsubishi drives)* Slimline ... **£705**
PACE PDD3 *(Cannon drives)* Slimline **£701**

In order to help you choose the right drive here is a short list of application areas for each of the above.

Schools: CS50A, CD50A, PSD1, PDD1.
General Hobbyist: CD50A, PDD1, PSD2.
Serious Hobbyist: PSD3, PDD2.
Programmers, Business Users, Database Users: CD55M, PDD3.

★ SPECIAL OFFER ★

Pace Disc Interface Kits for immediate despatch

£95 (inc. VAT P&P)

The kit includes II ICs and one DIL switch, utility disc, manual and easy to follow instructions. Now you can afford to upgrade your system with confidence. Don't delay – upgrade today!

IF YOU DON'T SEE WHAT YOU WANT . . . ASK US!

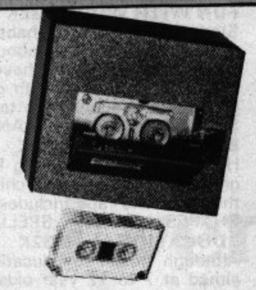
Centre

ACORN APPROVED BBC DEALER
Fast Mail Order service with full after sales service.

TELEPHONE YOUR ORDERS NOW!
061-483 3605 (24 hrs)

Frustrated by your cassette system but found the disc drive alternative too costly?

WE HAVE THE ANSWER...



THE HOBBIT
Floppy Tape System

- No costly disc interface required.
- Average access time 22 seconds (750 bytes per sec).
- Uses readily available 'micro' cassettes (101k each).
- Completely automatic – no buttons to press.
- System can support two drives
- Switch between your old tape system and THE HOBBIT at will.

£155.25
p&p £3.50

GAMES, GAMES, GAMES!

We have a wide range of games from leading software houses. All prices include P&P and VAT.

ACORNSOFT	
Sphinx Adventure	£9.95
Philosophers Quest	£9.95
Castle of Riddles	£9.95
Countdown to Doom	£9.95
Rocket Raid	£9.95
Arcade Action	£11.90
Planetoid	£9.95
Snapper	£9.95
Monsters	£9.95
A&F	
Pointer	£9.20
Frogger	£9.20
Planes	£9.20
Pharaoh's Tomb	£9.20
Horror Castle	£9.20
Howzat	£9.20
Shrinking Professor	£9.20
MP	
Swamp Monsters	£7.48
Firienwood	£7.48
Spaceguard	£7.48
Survivor	£7.48
Blue Dragon	£7.48
DIGITAL FANTASIA	
The Golden Baton	£10.29
The Time Machine	£10.29
Arrow of Death Part 1	£10.29
Arrow of Death Part 2	£10.29
Escape from Pulsar 7	£10.29
Circus	£10.29
Feasibility Experiment	£10.29
The Wizard of Akyrz	£10.29
Perseus and Andromeda	£10.29
Ten Little Indians	£10.29
MICRO POWER	
Swoop	£7.99
Alien Destroyers	£7.99
Galactic Commander	£7.99
Timetrek	£7.99
Laser Command	£7.99
Space Maze	£6.84
Demon Decorator	£7.99
Astro Navigator	£5.69
Maze Invader	£5.69
Startrek	£5.69
Killer Gorilla	£7.99
Croaker	£7.99

Calling all software houses. If you do not see your name here, get in touch with Jean Garside at the above number SOON!

TEACHERS!

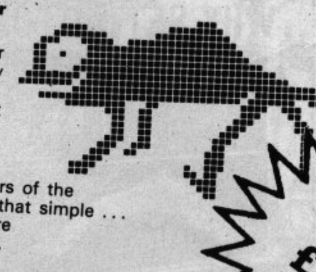
Here are some examples of our wide range of educational software. Our education advisers can help with your individual needs. Phone our support desk for details and a comprehensive list with software descriptions.

ACORNSOFT	Business Games	£9.95
	Word Sequence	£11.90
	Chemical Structures	£13.80
	Number Balance	£11.90
BES	Wordhang	£8.97
	Timeman One	£9.78
H&H	Shape and Race	£9.78
	Early Series	£9.78
MICROPOWER	World Geography	£6.84

Access & Visa orders welcome
ALL PRICES INCLUDE VAT

PROGRAMMERS LOOK
4,096 COLOURS

At last, real colours for the BBC Micro!



Let Chameleon bring your programs to life with truly authentic colours.
Mix and match the exact shades you require to give new depths of realism to your graphics.
Choose from all the colours of the rainbow – and more! It's that simple ... with this amazing hardware add-on for the BBC Micro.

Phone for details

Chameleon!

Complete for only **£89** inc. VAT

Business/Accounts Software from Gemini

On cassette:	*On disc:*
£19.95 each	**£23.94** each
Database	Database
Stock Control	Stock Control
Invoicing and Statements	Invoicing & Statements
Home Accounts	Home Accounts
Mail List	Commercial Accounts
Word Pro	Mail List
Beebcalc	Wordpro
Beebplot	Beebcalc
	Beebplot

Cashbook Accounts Program. Replaces manual system eg, Simplex and All-In-One).
Ideal for the small business.
Cassette: **£68.94** Disc: **£73.54**

ROM BASED SOFTWARE BARGAINS

Wordwise.......................... **£41.40**
Beebcalc.......................... **£38.10**

VAT + p&p included

Please telephone or post your order to:

WILMSLOW MICRO CENTRE
Norbury House, Norbury Crescent, Hazel Grove,
Stockport SK7 5NY.

Please supply the following:

Item	Qty	Total £ p
	P&P	
	TOTAL	

Please indicate method of payment

☐ Cheque payable to Wilmslow Micro Centre
☐ Access/Barclaycard No.

Name ....
Address ....
....
....
Tel. No. ....
Signed ....

WE HAVE THE TECHNOLOGY
TO IMPLANT
DOUBLE DENSITY
IN YOUR BBC MICRO
WHY SETTLE FOR LESS?
ACORN
£79.00
+ VAT

- Double Density
- Up to 248 Files
- Automatically checks for Correct Density
- No. 8271 (Rare & Expensive)
- Simple to fit
- Utilities provided
- Defaults to single Density on power up
- User Definable Density
- Single or Double sided
- 40 or 80 Track
- BBC DFS Compatible
- Own PCB with separate 8 Mhz clock
- No links to change
- No soldering

OAKLEAF COMPUTERS LIMITED

NOW OPEN

100, Boughton,
Chester,
Cheshire.
0244 310099

121, Dudley Road,
Grantham,
Lincs.
0476 76994/70281

ACORN SPECIALISTS

BBC SOFTWARE

QUALITY SOFTWARE PRODUCED BY PROFESSIONALS.

EDUCATIONAL

Our educational software is used in hundreds of schools throughout Great Britain.

FUN WITH WORDS 32K **£8.00**
Start your fun with alphabet puzzle in GUESS A LETTER. Continue your play as you learn about VOWELS, know the difference between THERE and THEIR and have games with SUFFIXES. After working so hard reward yourself with games of HANGMAN. Complete with graphics and sound. The tape includes ALPHA, VOWELS, THERE, SUFFIXES, and HANGMAN.

EDUCATIONAL - 1 32K **£8.00**
Hours of fun and learning for children aged 5 to 9 years. Animated graphics will encourage children to enjoy maths, spelling and telling the time. The tape includes MATH1, MATH2, CUBECOUNT, SHAPES, MEMORY, SPELL and CLOCK.

EDUCATIONAL - 2 32K **£8.00**
Although similar to Educational - 1 this tape is more advanced and aimed at 7 to 12 year olds. The tape includes MATH1, MATH2, AREA, MEMORY, CUBECOUNT and SPELL.

GAMES & UTILITIES

KATAKOMBS 32K **£8.00**
Are you cunning enough to discover and seize the treasure in the Katakombs AND return alive? What and where are your enemies? Can you outwit them? Yes? Then your adventure will take you through unending forests, beside tumbling streams, over the lonely plains to desolate ruins and finally to the tortuous Katakombs. Be prepared for anything!

GAMES OF LOGIC & CUNNING 32K **£8.00**
For children and adults alike. The tape includes AUCTION, FLIP, REVERSE, TELEPATHY and HEXA15.

SUPERLIFE 32K **£6.90**
Fast (machine code) version of a popular 'Game of Life' in a large universe.

UTILITIES 16/32K **£8.00**
Behind the mundane title lies an assortment of useful procedures and functions which can save you hours/days of programming effort: date conversion, input and validation routines, graphic routines (cube, rectangle, etc) search, sort and many more.

★★★ SPECIAL OFFER ★★★ Any 3 cassetes for £20.00
Add 50p per order for p/p.
Cheque/P.O. to:

GOLEM LTD., Dept B,
77 Qualitas, Bracknell, Berks, RG12 4QG. Telephone:
(0344) 50720

RICKSOFT

BBC RICKSOFT LIBRARY

SOFTWARE

... Arcade Games ... Adventures ...
Educational ... Utilities ... Languages ... ROMS
... and more

... coming soon ...
Discs, Light Pens, Graphics Tablet.

HIRE

BUY

Most from £1
per fortnight
With up to
25% discount

Membership £10
For catalogue and membership form send name and address to
Ricksoft, 78, Warren Drive,
Hornchurch, Essex RM12 4QX.
Tel: 040 24 47722

RICKSOFT

Even ITV has that flickering problem

IN many programs it is useful to turn off the flashing cursor and having OS 0.1 I use VDU23; 8202; 0; 0; 0 as explained on page 77 of the User Guide.

However sometime in the past I was having trouble with a program and quite by accident I added an extra 0 on the end (ie, VDU 23; 8202; 0; 0; 0; 0) and found that the problems vanished!

Recently I was teaching myself to use files on cassette and found that the command OPENIN wasn't freeing the cassette recorder.

I had the VDU command mentioned above in my program and adding the magic extra 0 allowed the cassette motor light to come on. Why is this so?

On another question, when I change MODE within a program there is often an unpleasant flickering. Is there any way to avoid this? – **John Tissandier, Bampton, Devon.**

● Thanks for the VDU tip. As to the flickering on change of mode this is inevitable as the 6845 CRT controller is reprogrammed and so produces the next frame-sync pulse too early.

This happens with the ITV network when they switch between the national networked programs and the local adverts.

What they do to minimise the annoyance is to blank the screen while this is happening. You can do this by clearing the screen before the mode change and then using a delay loop for at least 0.1 second before continuing.

This will not cure the flicker but make it less objectionable.

Answer in the PAGE

I HAVE a problem that is driving me crazy.

On tape I have some useful utilities. Occasionally after loading in some other tape, a game or application, something goes wrong or I want to inspect the commands.

If I then load on a utility it overwrites what I have in RAM. Is there a way of loading in a utility after an object programme so that the two are in RAM and can interact? – **Trevor M. Artingstoll, Zwolle, Netherlands.**

● The answer is to alter PAGE, the value of which determines where Basic begins to store its programs.

PAGE increments in multiples of 256, so what you should do is add 256 to the end of the object with:

PAGE = TOP + 256
NEW

Then you can load your utility in, and examine the first program.

You'll have to increment PAGE by more than 256 if you want to move back to the original page and run it, as the variables may overwrite your second program.

Bug that wasn't

HOW disappointed I was that in Chris Martin's review of Wordwise in July's issue of The Micro User he didn't discover the bug that is so obviously present if he had checked out all the commands. I refer to "GF", the get file command.

On page 19 of Computer Concepts' operating manual for Wordwise, it states: "When the formatted document is being output (Menu options 6, 7 and 8), this command will make the computer attempt to load a file from tape or disc and dump it direct to the printer. This file may consist of any data previously saved, for example, normal text saved with Menu options 1 or 3, or it may be a 'SPOOLed' BASIC listing".

I discovered, when writing an important report and trying to call in a section from another report I had previously written and saved on tape with menu option 1, that this GF command does not work.

It ignored the embedded commands (indeed, it actually printed them), printed about two lines then stopped. Everything I had written before and after was completely lost. No keys would respond except "Break".

On making enquiries of Computer Concepts I received a reply saying that the GF command "only dumps a straight Ascii file to the printer (one saved with menu option 8) and not a normal Wordwise file with embedded commands".

I have asked why the manual did not say this and enquired if they are planning an improved chip which will do what they specify (shades of the BBC Micro here!) but have received no reply to date. – **Stephen Wallington, Colden Common, Winchester.**

● This problem seems to be based on a misunderstanding of the manual. From the quoted extract we understood the program would input Ascii files, as indeed it does. It is therefore wrong to call it a bug.

Perhaps the error lies in the manual not underlining the fact that, once embedded commands are included in the text, menu options 1 and 3 no longer produce straight Ascii files.

This is because the embedded commands are not text characters but control characters.

Once text has embedded commands in it menu option 8 should be used on files you wish to incorporate into other pieces of text.

The advantage of using menu options 1 and 3 over option 8 however, is that a text file is produced with no added carriage returns.

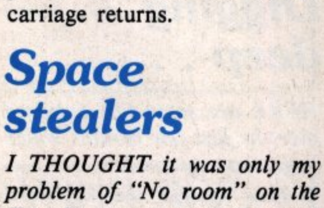
Space stealers

I THOUGHT it was only my problem of "No room" on the King Kong program in the April issue of The Micro User. But with Mr Summers letter and your reply in the June issue, I see I am not alone.

On running the program "No room" appeared before the first game was completed. I then used a program compactor which reduced my typed programs length (1E 1EB9).

When this was run the "No room" did not appear until the fifth score in the Hall of Fame.

My final solution was to load it as two programs as:



```
10 REM KONG
20 MODE1
30 *FX15,1
then lines
170,180,190,200,210 and 220
230 PRINT"""LOADING
-KONG-":CHAIN"KONG":END
```

This loads in 04 0422 followed by the main program less lines 170, 180, 190, 200, 210 and 220 which loads in 1A 1A79.

When it is now run I have the

→

From Page 109

full use of the Hall of Fame and the "No room" has not reappeared since. – **John F.A.B. Childs, Huntingdon, Cambs.**

● It appears that you had inadvertently added some blanks into the listing as the program compactor successfully removed them. There is perhaps some other bug lurking in your program that is stealing some extra space.

Nevertheless, thank you for your suggestion. We are sure it will be of help to others planning to write programs that will not fit in the computer without being broken up.

Digging deep . . .

HERE are some tips acquired over the last few months which might interest readers.

● ***How to get the keyboard scan value.***

Yes, I hear you all cry, ?215 . . . but that's only for the 0.10 OS! The location needed for all 1.20 owners is 236, for example LDA 236 : CMP 201 : BEQ RETURN will branch in assembler if RETURN is pressed.

● ***What *FX 154,X does (OS 1.20).***

Use this command in Mode 7 for the best results.

When X = 15 the cursor vanishes.

When X = 47 the cursor is double the normal width.

When X = 111 the cursor is triple the normal width.

When X = 235 the cursor is quadruple the normal width.

● ***How to cheat at Acornsoft games.***

Some readers may have seen the sneaky Planetoid POKE published in another magazine. (Press ESCAPE after loading all Planetoid parts and type ?&276B = &99 : GOTO 200 RETURN directly. This will give you 99 lives and smart bombs.)

If you have the old Defender by Acornsoft do exactly the same thing, but use ?&2638 = &99 : GOTO 200 instead.

If you have Meteors, load all parts, then press ESCAPE and type ?&1711 = 36 : GOTO 400. This will give you 36 lives!

Warning: If you try more than 36 lives, you can crash into them!

● ***Want to recover Snapper after you pressed BREAK by a mistake?***

*Before loading type *KEY 10 CALL &657:M. (Version 1 owners use CALL &64F instead.) When BREAK is pressed in the middle of a game, SPACE will restart it (or FIRE on joystick). The Version 1 game doesn't need SPACE to start. Unfortunately, the hi-score table is lost, so press BREAK again for another game.*

● ***Four way scrolling.***

?850 = 1 for OS 1.20 or ?804 = 1 for OS 0.10 and hold down CTRL J to scroll to the left or CRTL K to scroll to the right.

● ***Two abbreviated OS 1.20 commands.***

**. = *CAT and */ = *RUN"".*

● ***How to find the top left of the screen (even after scrolling).***

!&350 AND &FFFF (OS 1.20) or !&322 AND &FFFF (OS 0.10).

● ***Solving the DFS space shortage.***

*A lot of rubbish is talked about this problem. All that is needed is PAGE=&E00 before typing in or loading (don't forget *TAPE) a program. The main problem is that memory below &1900 is corrupted when the discs are used, so don't save to disc if PAGE<&1900!*

● ***How to get more memory space on any BBC Micro.***

PAGE=&900 but don't use discs, user-defined keys or user-defined characters otherwise you'll lose your program!

● ***One problem I'm stuck on (OS 1.20).***

Why does the SHIFT LOCK light go on when the sound buffer is full?

I hope you enjoyed these tips (especially the games ones) and I hope you publish them so other BBC Micro owners can use them. – **Richard K. Lloyd, Lower Heswall, Wirral.**

● Thanks for the tips. You certainly have been busy digging in the depths of the operating system.

As you have found, the version of the operating system is vital to correct operation. This is just the sort of information that Acorn would prefer you not to use as it will tie your programs to one operating system.

Providing you don't want to sell your programs with these features in then we think they can be jolly useful. Thanks again.

Still a mystery

FIRST the good news. Part 4 of Structured Programming by Roy Atherton has hit the nail on the head about GOTOs and explained how to avoid them extremely well. He has a very clear style of writing and doesn't assume too much. More articles by him please.

Now the bad news. The contents page of the August issue offers "A simple guide" to logical operators – something which has always been a dark mystery to me!

It is still just as dark a mystery. If this is a simple guide I would hate to see a complex one.

The first line mentions "bitwise operators" but doesn't explain this jargon. The rest of the article is so "unstructured" it is very difficult to follow Mr Hardy's train of thought.

He also assumes a knowledge of Boolean algebra. Is this still a "simple" guide?

Could he not have explained whatever we needed to know? Better still, couldn't you get Roy Atherton to write the article. – **Chris Parry, Stratford-upon-Avon.**

● The topic of logical operators is difficult for some people to grasp. It seems with logic some people can grasp a concept easily while others have great difficulty.

To be fair to Mr Hardy he does not describe his article as "a simple guide", although it was in the table of contents.

When setting out to explain a complex topic, some measure of prior knowledge must be assumed. We think Mr Hardy assumed you had read page 205 of the User Guide which explained bitwise operations or, if not, page 81 of the same issue of *The Micro User* described them in even more detail.

On the question of style, this is mainly a matter for personal taste. Sometimes style can get in the way of understanding and other times enhance it. We are sure we will be returning to the important topic of logical operators again and hope that when we do so it will be more to your liking.

Monitor selection

WE recently purchased a BBC Micro Model B, Wordwise and an Epson RX-80 printer to help us with the small mail order business my wife and I run.

I now want to purchase a colour TV to make the best use of the micro's colour capabilities. At present we have a black and white portable TV.

I'm particularly keen to get a monitor/TV or TV with RGB input. I would be grateful if you could tell me whether the BBC Micro works best with any particular model or brand.

Also I'm confused by the difference (if indeed there is any!) between a monitor/TV and a TV that provides RGB input. Surely in the case of the latter the input by-passes the TV tuner and hence is effectively a monitor.

The other thing that concerns me is that manufacturers or distributors rarely seem to quote the resolution that their products provide. Is there any guide that has been published

BBC COMPUTERS
FROM **FAIRHURST**
INSTRUMENTS LTD.

WORD PROCESSING PACKAGE
£999 + VAT

Includes: BBC 'B' with disc interface, disc drive, daisywheel printer, Wordwise, all cables etc.

BBC 'B' Disc Controller Chips, Disc Drives and Upgrades.

ALL FOR IMMEDIATE DELIVERY

We stock the complete range of BBC equipment including, Econets, Printers, Colour Monitors, Plotters, Graphic Tablets and Software.

Apple and Torch Computers available.

Phone: Wilmslow (0625) 533741
Dean Court, Dean Row,
Woodford Road, Wilmslow.

CUMANA DISC DRIVES ARE THE BEST
MY PRICES ARE THE BEST IN THE UK.

Examples:
CS50A Standard height, single drive, single sided, 40 track **£180**
CS55E Half height, single drive, single sided, 80 track **£241**
CD55E/S Half height, dual drive, single sided, switchable 40/80 **£463**
CD55M/S Half height, dual drive, double sided, switchable 40/80 **£577**

Further discount available for orders of 5 or more.
ALL PRICES INCLUDE CABLE, FORMATTER DISC AND MANUAL.
Education Authorities supplied.
Disc Interface for BBC Micro **£81**
Disc drive delivery charge £5 per item. VAT 15%

Send for full price list to: GEOFF CROFT,
7, Trafford Road, Alderley Edge, Cheshire SK9 7NT.
Telephone: 0625 583686

PAEAN systems

Quebec Marketing MU, Little Bealings,
Woodbridge, Suffolk IP13 6LT.

PAEAN are hunting for high quality, imaginative and exciting programs for the BBC Micro to market in the UK and overseas.

If you have written an original games, educational or business program which you believe has commercial potential, send a cassette to PAEAN Systems and if we agree with you, we will offer you a contract. Don't forget to include your name, address and telephone number.

Think about this:
A £50 note will be sent to the first response which correctly interprets the hidden significance of the PAEAN Logo.

Winner's name will be published.

DO YOU WANT A WORD PROCESSOR FOR YOUR BBC OR A WORD PROCESSOR FOR YOUR BBC ?

Yes there is a difference between word processors and we can offer the best because it's the FIRST PROFESSIONAL DISC BASED WORD PROCESSOR FOR THE BBC COMPUTER.

The MERLIN SCRIBE uses the disc on your computer the same way that professional systems costing many hundreds of pounds do.
Until now any document you wished to create has been limited to the few pages which could be squeezed into your computer memory. This means the computer is really using the disc as if it were a cassette!
The SCRIBE can create documents far greater in size than the computer memory, and really uses the disc as it was intended to be used. SCRIBE automatically loads and offloads pages between disc and memory without you even knowing it's happening!

Amongst the many super features available are:
* Optional 40 & 80 column screen format selection.
* On screen formatting - you see it as it's printed INCLUDING UNDERLINING.
* Right justify, word wrap, insert, delete, move copy & centre.
* Document merge (will merge two documents into one from disc).
* Addresses all four drive units allowed by your BBC disc system.

Plus many more professional features.
SCRIBE comes in ROM with five minute fitting instructions, printer utilities on disc and a comprehensive manual.

PRICE £59.95

Also MERLIN SCRIBE in ROM for cassette machines £29.95, and on tape £19.95. All prices include VAT.
Post and Packaging 60p.

MERLIN COMPUTER PRODUCTS (BUCON LIMITED)
18 MANSEL STREET, SWANSEA, SA1 5SG. TEL (0792) 467980

VISA

Access

GRUNDIG
KINGSLEY

R.G.B. MONITOR/TV
(GRUNDIG APPROVED)

As supplied to Education Authorities Specification

R.G.B. inputs (Analogue and Digital Levels) all models 1 Volt P.P. composite video (remote model only) Teletext decoder available to plug into chassis. (remote model only). Remote control of computer via monitor (remote model only). Sound input gives access to audio amp all models. Instantly switches back to TV.

12″ MONOCHROME MONITOR/TV	£95 + VAT
14″ COLOUR MONITOR/TV	£227 + VAT
16″ COLOUR MONITOR/TV	£255 + VAT
16″ COLOUR MONITOR/TV REMOTE	£295 + VAT
20″ COLOUR MONITOR/TV REMOTE	£315 + VAT
22″ COLOUR MONITOR/TV REMOTE	£340 + VAT
26″ COLOUR MONITOR/TV REMOTE	£380 + VAT
PLUG IN TELETEXT MODULE	£75 + VAT
CONNECTING LEAD	£5 + VAT
CARRIAGE AND INSURANCE	£9.50
4 YEAR GUARANTEE	£29.60

KINGSLEY

40-42, Shields Road, Newcastle-upon-Tyne,
NE6 1DR. Tel: (0632) 650653

HARDWARE AND SOFTWARE Micro-Aid **FOR THE BBC MICRO**

SOFTWARE - Programs that are guaranteed to run! Save hours of work and worry with these utilities and practical programs on cassette or disc. Orders are posted the same day.

102	**CASHBOOK**	Double entry 4 columns wiht accounts & analysis	£ 7.95	B
102d	**CASHBOOK**	Full disc version. 1100 items on 100k disc	£13.95	B
103	**LEDGER**	Complements CASHBOOK with ageing and analysis	£ 7.95	B
104	**INVOICE**	Uses the CASHBOOK file extending the set	£ 7.95	B
105	**MAILING**	Holds 218 addresses. Alpha & post code sorts, fast search, any format labels & update	£ 7.95	B
106	**PAYROLL (W or M)**	In 2 parts to handle (separately) weekly or monthly PAYE & NI for 100 employees. Fully supported.	£17.95	B
106a	**Manual**	30 page A4 manual with examples. Extra. No VAT	£ 2.50	
107	**MEMO-CALC**	Database/Calcsheet with up to 255 columns, string or numeric data, sorts, searches, calculations, with automatic fully formatted printout facility	£ 9.95	B
107a	**Manual**	20 page A4 manual with examples. Extra. No VAT	£ 2.00	
201	**GAMES 1**	5 Card, Minefield and 3 other exciting games	£ 4.95	B
203	**HANGMAN**	Word game in English, French, German, Italian, Spanish	£ 7.95	B
301	**BANNER**	Printout large text and graphics on paper	£ 2.95	A/B
302	**DISTANCES**	Three graphic maps of U.K., EUROPE & the WORLD Calculate the distance between any 2 places.	£ 4.95	B
303	**FLAGS**	98 full colour flags of the world with questions	£ 4.95	B
304	**STATPACK**	Statistics package giving over 30 results	£ 9.95	B
504	**PROCAID**	includes SEARCHBAS to search a BASIC program and alter it, PROCVAR to list variables in a BASIC program & PROCFLUSH to clear resident integers in RAM	£ 3.45	A/B
505	**UTILITY-A**	Our best selling tape includes PROCAID DEFCHR to design, display & store graphic characters, SORTM/C a very fast machine code numberic sort, SORTBAS The undisputed fastest BASIC sort routine	£ 5.95	A/B
600	**FORTH**	'79 FORTH second language ROM for either OS	£34.74	B
601	**LOGO-FORTH**	Another language ROM for the BBC Micro	£55.00	B
602	**TINY PASCAL**	Structured language ROM for the BBC Micro	£55.00	B
605	**WORDWISE**	Superb fast & easy Wordprocessor in ROM	£34.74	B
606	**BEEB-CALC**	ROM based spread sheet with floating point maths	£32.50	B
607	**DISKDOC**	ROM for disk problems in format, search, files etc	£19.00	B
608	**PRINTPAK**	Toolkit for ROM for screen dumps, spooling etc.	£19.00	B
721	**BOOKS**	Various titles for the BBC Micro from	£ 6.95	
801	**CASSETTES**	C12 Computer quality tapes boxed in 10's	£ 4.50	
810	**5.25″ DISCS**	MEMOREX Soft sectored 40 track S/S Discettes	£19.95	
900	**SEIKOSHA GP700A**	NEW 7 COLOUR dot matrix printer 50cps	£369.00	
901	**EPSON RX-80**	Superb printer. 100cps, 3 fnts, graphics, tractor	£269.00	
902	**EPSON FX-80**	Magnificient. 160cps, 6 founts, graphics, F/T Roll	£379.00	
910	**DISC DRIVES**	Slimline TEAC or MITSUBISHI with power supply, 100k - 800k format disc cable and excellent manual. From	£199.00	
920	**VDU STAND**	Stainless Steel Support protects your micro	£19.95	

ADD VAT TO ALL PRICES EXCEPT MANUALS AND BOOKS.
FOR COPIES ON DISCS ADD £1.50 PER DISC. NO PACKING CHARGES.
MOST PROGRAMS AVAILABLE ON MICRONET 800.

If you want further information before parting with your hard earned cash send for our free brochure to:-

Micro-Aid (MU)
25 Fore Street, Praze, Camborne, Cornwall TR14 0JX.
Tel: 0209-831274

VISIT STAND 1
Nottingham Show
17-19 September

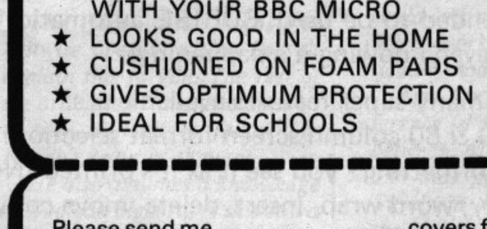
Silicon Centre
Edinburgh

	ex VAT	inc. VAT
BBC Model B	£348.26	£399.00
100K TEAC single disc drive	£179.00	£205.85
200K TEAC twin disc drive	£339.00	£389.85
800K twin double sided 80 track drive	£575.00	£661.25
800K PACE dual 40/80 switchable	£610.00	£701.50
400K PACE 40/80 switchable	£345.00	£396.75
TORCH Z80 Disc Pac (800K + Z80+ 64K RAM)	£825	£948.75
EASYTABS PROFESSIONAL BUSINESS SOFTWARE FOR BBC/TORCH		
Sales Ledger	£99.00	£113.85
Purchase Ledger	£99.00	£113.85
Cashbook	£99.00	£113.85
Word Processor	£99.00	£113.85
Mail List (Link to Word Processor)	£99.00	£113.85
Sanyo 12″ Green Screen Monitor	£79.00	£90.85
Cabel 14″ Colour RGB Monitor	£189.00	£217.35
Microvitec 14″ Colour RGB Monitor	£239.00	£274.85
Epson RX80 Printer	£269.00	£309.35
Epson FX80 Printer	£359.00	£412.85
Star 510 Printer	£279.00	£320.85
Star 515 Printer	£379.00	£435.85
CP80 Printer	£279.00	£320.85
Juki Daisywheel Printer	£389.00	£447.35
Smith-Corona Daisywheel Printer	£469.00	£539.35
Byte-Writer Printer/Typewriter	£479.00	£550.85

Authorised BBC/Acorn Service Centre for Repairs, Upgrades, Modifications.

7 ANTIGUA STREET, EDINBURGH EH1 3NH.
TELEPHONE: 031-557 4546

A SUPERB HARD COVER for your BBC Micro



£10.95
(VAT included)
+ £1.55
Post & Packing
per cover

- ★ ENGINEERED IN TOP QUALITY HIGH IMPACT RIGID ABS. – VERY TOUGH
- ★ SUPER TEXTURED FINISH IN CREAM TO TONE WITH YOUR BBC MICRO
- ★ LOOKS GOOD IN THE HOME
- ★ CUSHIONED ON FOAM PADS
- ★ GIVES OPTIMUM PROTECTION
- ★ IDEAL FOR SCHOOLS

Please send me .... covers for the BBC Micro.

I enclose a cheque/P.O. for £ ....

Name ....

Address ....

.... Code ....

Please allow 28 days for delivery.
Send to:

Tekform

GRANGE CLOSE
SANDBACH
CHES.
CW11 9ET.

From Page 110

that gives this information? – **R.D. Hughes, Worthing, West Sussex.**

● It is not our policy to recommend specific products.

While a monitor may appear to be just a TV without the UHF decoder, true monitors are quite unique beasts, designed specifically to deal with the demands a computer places on them.

In our March and April issues we published articles on choosing a colour monitor. These featured test programs that might be of some use to you.

Naughty, but fast

As you know, the BBC has an inbuilt assembler and allows Basic and assembly language to be mixed within a program.

However, I have read that using assembler for moving graphics does not significantly speed up animation. Is this true? And, if it is, what are the advantages of using assembly language?

I wish to write games programs, and ultimately hope to write them in machine code to achieve speed. Is the assembler any use to me in this respect?

Lastly could you recommend a book which would help me achieve my aims? – **R. Lloyd, Worksop, Notts.**

● If you use one of the straightforward routines Acorn provide, then assembler language graphics won't be all that much faster, since the VDU statement passes its parameter straight through to these routines with little delay.

If, however, you are "naughty" and directly address the screen, you do obtain significant speed increases.

At the moment the only book is "Assembler on the BBC", by Tom Birbaum (see Bookshelf), but this doesn't go into graphics much.

Acornsoft are to publish a book tentatively called "Creative Assembler" which should cover this area.

And, of course, Micro User will be covering machine code graphics in the future.

Unstuck procedure

I THINK the answer to Fsa Al-Ramadham's question (May Micro User) about passing arrays to procedures is contained within Jeremy Rushton's book The BBC Micro Revealed, but I have to admit that I did not fully understand it.

Second, writing a hangman program for the kids I tried to use an array in a procedure to keep account of all the letters already tried.

This works fine the first time around but then comes unstuck as the array is partly full thereafter. How can I clear an array for re-use or is there another method?

Finally, it was I that submitted the "almost an hour to execute" solution to the March competition. My wife thinks that should qualify for a booby prize! – **John Beken, Great Baddow, Essex.**

● One way to be able to re-use the array would be to set all the strings to the null string by means of a loop. This assumes that the next array won't contain more than the first.

If you're going to want to redimension the array so that it contains a different number you'll have to use the command CLEAR.

This doesn't clear the screen, it just wipes out all the variables (so be careful), allowing you to redimension.

Assessing memory

I WAS interested to read the letter by J.E. Pearson in the August issue of The Micro User. Apparently he has been having problems with the game King Kong taking-up too much memory space in his BBC Micro.

I may have missed a point in the User Guide, or even this monthly magazine, but I still do not know how to tell how much memory is taken up by a particular program.

Presumably the numbers returned when you store a program on tape (or disc) are indicative of the memory taken up. As yet, however, the block numbers only tell me how much tape needs to be loaded.

I would be most grateful if you could enlighten BBC Micro users as to how they can assess the amount of memory used for a particular program. Surely, there must be an easy way of knowing that a particular program uses 'n'K.

I am familiar with using a mainframe computer, where program sizing is a matter of course.

I find the BBC Micro a first rate machine, which is well complemented by your magazine. – **E. Nicholl, Stockton-on-Tees, Cleveland.**

● To find out how much space

Joystick routine for Deathwatch

I HAVE read the letters about Deathwatch with interest and some amusement. It seems that you can never please all of the people all of the time.

Some commented on the idea that a joystick routine would be nice, so for those that have them and are interested here it is.

Lines 355, 645, 1115 and 1600 to 1670 are new lines to be included.

Lines 690, 1010 and 1590 are modified.

These changes may give rise to the infamous "NO ROOM", in which case you will need to find some.

Dare I suggest deleting line 10 as the obvious choice to start with?

The BBC joysticks have been used for this purpose and we find that they can be held either way. PROCJS can be modified to reverse the direction.

It may be noted that use of the joystick (singular, right hand in our case) is actioned by pressing the fire button to start the game. The space bar is used to start keyboard play.

The instructions are not amended for joystick use to keep the changes as simple as possible. – **Brian Clark.**

```
  355  A=ADVAL(0) AND 3:IFA=2GOTO 370
  645  IF JS% PROCJS:ENDPROC
  690  T1%=TIME+150:REPEATUNTILT1%<TIM
E:G%=32:PROCST
 1010  PRINTTAB(4,22)"Try for a high n
umber of hits:";:PROCST:ENDPROC
 1115 AD=128
 1590  PRINTTAB(4,22)"Ready to try aga
in?";:Q%=C%:PROCST:ENDPROC
 1600 DEFPROCST
 1610 REPEAT:I%=INKEY(0)
 1620 JS%=ADVAL(0)AND 3:IF JS%=2 ENDPR
OC
 1630  UNTIL I%=32:ENDPROC
 1650  DEFPROCJS
 1660   AD1=ADVAL(3) DIV 256:IF AD1 DI
V   20 < AD DIV 20 CALL LT:AD=AD-15:EN
DPR  OC
 1665  IF AD1 DIV 20> AD DIV 20 CALL R
T:AD=AD+15
 1670  ENDPROC
```

From Page 113

it takes to store a program type:
PRINT PAGE–TOP

If you want the answer in K then divide the result by 1024. However, this is not the whole of the story. Whereas a computer's memory may be big enough to hold a program it might not be big enough to run it.

This is because while a program is running, it takes extra space for variables, strings and graphics so you will see there is no way of telling if a program is too big to run.

This is exactly the same situation as when using a mainframe, but there the total amount of memory is very much larger so the problem does not arise as often.

As strings take up a variable amount of space, working near the limit of the computer's capacity poses problems for games like Kong that have a hall of fame.

If every player had a 256 character name then 10 players would grab another 2.5k of precious memory.

Clearing the dregs

HERE are a few tips which may be of use to readers. I don't claim them all to be original, but maybe I have had my BBC longer than most . . .

Sometimes sound in a program can be corrupted by machine code left over from a previously run program. The answer to this is to make the first line of a program using sound

```
FOR A=&800 TO &8FF :
?A=0 : NEXT
```

as this clears any unwanted dregs.

An easy way to do a screen dump to a printer is to have a line such as

```
ON ERROR CALL XXXX :
END
```

where XXXX is the address of the dump program. Pressing ESCAPE at the required moment produces a screen dump.

The way to have a program LIST or NEW etc. is to have lines like

```
ON ERROR NEW
ERROR
```

at the appropriate place.

If a printer "hangs up", probably after pressing ESCAPE during printing, try flushing its buffer.

```
VDU 2 : FOR A=1 TO 256 :
VDU 1,127 : NEXT : VDU 3
```

– Paul F. Tolson, Dewsbury, West Yorkshire.

● Memory locations &800 to &8FF are designated miscellaneous workspace and are not for user machine code calls.

If you are putting machine code in this area you should expect trouble. We are always wary about using the ON ERROR function as it will trap real errors as well as the break key.

You do not want a screen dump every time there is a syntax error, do you?

Our favourite way of calling a screen dump is to use the INKEY command with a negative argument so the dump is only called when we want and the program is ready. This also does not stop the program.

Format problem

JIM Notman's program to format program listings is excellent, producing a very clear printout of a Basic program.

I was therefore very disappointed when I found I could not use it on my cassette-based system.

I had very carefully typed in the program, checked a printed listing of the program and corrected any errors I had found. I then SAVEd the program on cassette and ran the program to produce a listing on the saved cassette program.

It read in the first block, correctly listed it and then read in the next block. It then immediately jumped out of the program with the error message BLOCK? at line xx.

As I have found out what caused this problem I thought you might like to publish the hint on how to use this program with a cassette-based system.

*The basic problem is the cassette recorder itself. The clues to solving the problem are found on Page 398 of the User Guide. On this page it states the default settings of *OPT1, 2 and 3.*

When a program is SAVEd using the normal Basic system, the time gap between the blocks is 0.6 sec.

If the cassette recorder does not stop instantaneously after reading in the first block (00) the next block it reads in is the third block (02) as the overrun of the cassette motor will have taken the header of the second block (01) passed the head. Thus the error message BLOCK?

If you want to see this happening then before running the program enter:

```
*OPT1,2
*OPT2,1
```

and the whole story is revealed.

The solution to the problem is given on page 369 of the User Guide. Before recording the program enter:

```
P.~TOP
```

This will give in Hex the top of the program (159E in my case).

```
P.~PAGE
```

To get the bottom of the program. (E00)

```
PAGE=H.–&200
```

To reset PAGE way above the program.

```
NEW
10X% = OPENOUT "FOR
MATTER": FOR D% = &E00
TO &159E:BPUT£X%,
?D%:NEXT: CLOSE£X%:
END
```

Enter RUN and save the program with inter-block gaps of 2.5 seconds. Then enter:

```
Page=&E00
```

Run the formatter program and the listing given in the July issue of The Micro User will be obtained.

I hope this explanation is understandable and will be of use to your readers. **– P.J. Swan, Streatley, Berks.**

● The problem, as you say, is in your cassette recorder. The formatter works fine with all the recorders we have tried.

We think you should have it seen to or wire it up so that the cassette relay actually turns off the motor. Without knowing the type of recorder it is difficult to offer any suggestions.

However it may be possible that other people also have faulty recorders and this solution offers a way round the basic problem.

Tuning your beep

HAVING read the article in your June edition filling in some of the missing OSBYTE numbers, I see a sequence 211,213,214 relating to channel, pitch and duration of the "beep".

It occurred to me that with the missing code of 212, these correspond to the operands of the SOUND keyword. Thus 212 ought to control the amplitude of the "beep', and indeed it does.

Whereas the SOUND keyword uses a signed integer in the range –15 to +16, in FX212 this value is reduced by 1, multiplied by 8 and treated as an unsigned integer.

Therefore, if given a value between 128 and 248 which is a multiple of 8, the volume levels corresponding to –15 to 0 may be obtained. Values between 0 and 120 correspond to envelope numbers 1 to 16.

However some caution is needed, as any value not divisible by 8 seems to kill the "beep" completely, requiring a break to restore it.

*While on the subject of *FX codes, I would like to seek some advice on *FX139 or *OPT.*

*When first starting up, or after a break, messages are only produced by LOAD, CHAIN, *LOAD and *RUN, not by *EXEC or program file operations.*

*After a *FX139 or *OPT command has been used to set messages on, the only way of setting them off again seems to be to use *FX139/*OPT to set*

ALL messages off.

Please does anyone know of a way, other than using break, to revert to the original condition? – **Dave Moll, Faringdon, Oxon.**

● We are a little puzzled as our operating system 1.2 gives messages with the *LOAD and *RUN straight from start up. Maybe some readers could help?

Slow but sure

THREE cheers for your Bits 'n' Bytes series.

Please continue in your slow fashion, not presuming that we are all genius at maths. – **Mark Lester, Hampstead Garden Suburb, London NW11.**

● Thanks, we have always maintained that you need very little maths to understand computers.

Saucer ahoy!

MANY thanks to Mike Cook for his super program in the July Micro User for drawing wire frame solids.

He says we might want to tinker with it, so see what you think of this:

Change:

```
770 R1=32
in line 420 change MODE0
to MODE1
840 FOR R=1 TO R1/2
```

Add:

```
835 VDU
19,1,11,0,0,0,19,2,12,0,0,
0
855 GCOL0,R MOD 2+1
915 GCOL0,3
935 VDU
19,1,3,0,0,0,19,2,4,0,0,0
936 K=GET
```

Now try designing a flying saucer; then reach for the seasickness pills!

In the article Mike says it is possible to write a simple routine to eliminate the hidden lines, albeit with limitations.

Well now he's on your payroll, how about getting him to write one for us while his soldering iron is warming up one morning? – **Paul Holgate, Nottingham.**

● Glad you enjoyed the program. Your modifications did not produce any colour on my TV set as the lines were a bit too fine, but it works OK on a monitor.

As to the hidden line routine, well my soldering iron takes only 30 seconds to warm up and not even I am that good.

Don't despair however, as we have an article in the pipeline by John Thorpe describing exactly how to do it. – **Mike Cook**

Accent on education

YOUR magazine has a good blend of articles likely to interest persons with different degrees of knowledge of computers and I shall continue to purchase it and the tapes for the forseeable future.

The articles on graphics and learning how to program are easily comprehensible and of a high standard. The authors are to be congratulated.

However, programs of an educational nature, for example, geography would be welcomed.

I thought the Air Strike game was of an appalling low standard as compared to Death Watch or Space Pilot. You risk your reputation by publising such inferior material.

In conclusion, I consider your magazine is good and I hope that it will maintain the standard that it has set.

I also hope that you will consider this as constructive comment. – **Peter Hume-Spry, Nottingham.**

● Thank you for your comments. We are committed to publishing educational programs and will be carrying more such features in future. However the truth is that there seems to be rather a shortage.

As for Air Strike, it's amazing how tastes differ – many readers consider it one of our best. However thanks for the feedback – we do take readers' comments very seriously.

● ***Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.***

And finally, with tongue firmly in cheek . . .

The other woman was a micro

HISTORY was made at Ipswich Crown Court today when blonde, attractive 33-year-old Susan Smith was granted a decree nisi on the grounds of her husband's unreasonable behaviour.

"I still love him," she sobbed as she talked to reporters, "but how could I compete with a rival like that?"

The rival in question is a Model B BBC Microcomputer.

"George was never the same after he got it. He wouldn't talk to me. I'd be discussing new curtains or the garden and he'd be miles away with a stupid blank look on his face.

"And that was only when I actually saw him. He was always up in the attic bent over that, that, THING! The kids had started calling him Quasimodo".

Meanwhile husband George was talking to the clerk of court about a new scheme for computerising the court's records.

"Yeah, well," he said, "it did come as a bit of a blow as she's got custody of the kids and the micro, but I'm hoping to remedy it all 'cause all of this has given me a great idea.

"This divorce business is really complicated, so many rules and regulations, things to be done, letters to be sent.

"I'm going to see if Sue will hire me the attic and the micro and I'll write an educational package about getting divorced. It'll sell like hot cakes."

So George carries on with his obsession while Susan cries for the man she loved. What will happen to the couple the micro came between? The future looks bleak.

As reporters left the court George was trying to interest them in a new piece of software he'd written using the BBC Micro's sound facility.

"It's great," he enthused "It's called Bellringer."

northern
computers
micro computer systems for all applications

education and
training division

location

M6
Fylde
Preston
M6
M62
Liverpool
Warrington
Manchester
M56
M6
Buxton
FRODSHAM
(junc.12 M56)
Chester
North Wales
Wrexham
Stoke
The Potteries
M6

For Educational and Training Institutions only:

Apple II, III
BBC (Free Econet Interface).
Newbrain
Green Monitors £79
Colour Monitors £199
Seikosha Printers £207
Epson Printers £349
NETWORKS
Coming soon:
Acorn Electron

we supply everything to meet the requirements of secondary schools, colleges and universities, whether it be small B.B.C. computers, Apple IIe computers, or Apple III school administration and accounting systems.

please contact: Gareth Littler or David Horsfall
EDUCATION & TRAINING DIVISION

Northern Computers, Churchfield Road,
FRODSHAM, CHESHIRE WA6 6RD Tel: (0928) 35110

ADVERTISERS INDEX

AMS 4
Acorn 3
Aerospace 63
Aimgram 84
Alpha Disc 67

BBC Publications 46
B S Dollamore 116
Bourne Educational Software 35
Broady 30

C-Tech 48
Carson Developments 117
Chalksoft 84
Clares Micro Supplies 47
Computerama 81
Computer City 119
Computer Concepts 2/118
Contex Computing 83

DACC 84
DA Computers 98
DRG 54
Datatech 117
Digital Fantasia 20
Doctor Soft 83

Electronequip 34
Eltec 105

Fairhurst Instruments 111

Gaelsett 35
Geoff Croft 111
Glengary Soft 88
Golem 108

HCCS Associates 82
Hexagon Software 104
Home & Business Computers 58

IJK Software 5
IQ Computer Products 96
Ian Copestake 35
Ikon 103
Inmac 29
Ixion 96

J&H Software 82
JP Magnetics 96

Kingsley TV Services 112
Kosmos Software 84
Kudosoft 83

LSA Systems 83
Leasalink Viewdata 92/93
Leigh Computer Systems 117
Level 9 Computing 78

MFI 24
MP Software Services 78
Mail Order Micros 90
Merlin Computer Products 111
Micro-Aid 112
Micro-Advent 98
Micro Management 100/101
Micronet 800 .... 68/69
Micropower 120/18/70
Micro-Spares 90
Microtest 117
Midwich Computers 32
Miracle Films 117
Multiplex Computer Services 83

Norsoft 98
Northern Computers 116

Oakleaf Computers 108
Opus Supplies 62

PJ Microsystems 96
Pace 30
Paean Systems 111

Red Shift 98
Ricksoft 108

SP Electronics 117
Silent Computers 117
Silicon Centre 112
Simon Hessel 64
Simonsoft 90
Skyleader 98
Small School Software 88
Softsmith 88
Stack 103
Starsoft 104
Superior Systems 8

Technomatic 38/39
Tekform Products 112
Torch Computers 44
Twillstar 13

Viglen 56
Voltmace 88

Watford Electronics 14/15/16/17
Wilmslow Micro Centre 106/107

AT LAST, A COMPLEX GRAPHICS SYSTEM, THAT'S SO EASY TO OPERATE

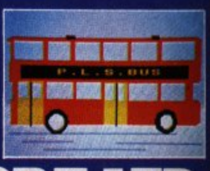
...IT'S PROFESSIONAL CAPABILITIES COULD BE UNDER ESTIMATED

P.L. DIGITISER SYSTEM™

The PL Digitiser System enables you to reproduce complex pictures and diagrams, or produce original designs, quickly, easily and accurately.

The Package consists of the 'Graphics Digitiser' incorporating a tracing pad (mapped out by rectangular grid) 256mm x 205mm and the 'Control Program' (Tape or Disc). This includes such features as automatic parallel, vertical, horizontal or diagonal lines, construction of boxes and circles from two probe positions, free hand draw, fill and outline, move and scale, immediate edit and the ability to save completed screens as files or reproduce by line printer.

R1
R2
R3
EXERCISE
DIAGRAM



B.S.DOLLAMORE LTD.
Burton Road, Burton-on-Trent, Staffs., England.
Telephone: Burton-on-Trent (0283) 217905.

U.K. Distributor LVL Scientific House, Bridge St.,
Sandiacre, Notts. Telephone: (0602) 394000.

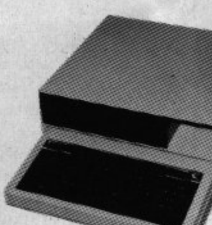
BBC MICRO CONSOLES

Not just a monitor/tv stand but an expansion console which gives your micro the professional look. Protects and encloses your micro with room for disc drives and 2nd. processor or teletext adapter etc., all untidy connecting wires safely out of sight within the console. Made of light yet strong aluminium with a textured finish in matching BBC colour. Coming soon a bolt on extra module to the console for further expansion options. YES this console will grow with your needs. Basic BBC console as shown **£39.99** + £4 carriage MAIL ORDER ONLY. Viewing by appointment only.

Please add 15% VAT.

For further information or send cheque to:

• The console will house the Torch Disc Pack



Matching Printer Stand, can double for VDU Stand over the micro – only £14.99 + £2 carriage

Silent COMPUTERS

27 WYCOMBE ROAD, LONDON N17 9XN.
TEL: 01-801 3014 (24 Hr Ansaphone)

TOP QUALITY PRINTERS!
ROCK BOTTOM PRICES!

EPSON RX80	**£258** + VAT	SHINWA CP80	**£258** + VAT
EPSON FX80	**£358** + VAT	STAR 510	**£258** + VAT
EPSON MX100	**£419** + VAT	STAR 515	**£368** + VAT

We also have large stocks of sundries including ribbons, fanfold and roll paper, continuous labels, dust covers, etc.

For FREE BROCHURE and DISCOUNT ORDER FORM write now to:

Datatech Ltd (TMU)
3 Bramhall Close, Timperley, Altrincham,
Cheshire WA15 7EB.

MICROTEST LTD.

18, Normandy Way, Bodmin, Cornwall. PL31 1EX.

BBC MODEL B's in stock **£399** – A/B UPGRADES **£90.00**
DISC I/F £90.00 – ALL UPGRADES FITTED FREE

STOP PRESS ... Teac SLIMLINES

FD55-A (100K, 40TK) **£195.00** – FD55-E (200K, 80TK) **£230.00** – FD55-F (400K, 80TK) **£290.00** – CD55-E (2x200K+PSU) **£500.00** – PRINTERS – CP80 **£332** – STAR DP510 **£332** – EPSON FX80 **£430** – EPSON RX80 **£305** – JUKI DAISY WHEEL **£458** – OTHERS AVAILABLE. WABASH (5¼") DISC PRICES (FOR NASHUA ADD 20p/DISC). SS,40TK **£17.00** SS, 80TK, 96TPI **£26.50** DS, 80TK, 96TPI **£28.75.**

Authorised BBC Dealers & Repairers.

– All prices VAT inclusive. Carriage at cost –

Over 20 years experience in the MICRO Business!!
FOR THE BEST, PHONE MICROTEST. BODMIN (0208) 3812

ALL IN STOCK

S.P. ELECTRONICS

BBC SPECIALISTS

BBC Model B 1.2 O.S	£399
Upgrade Kits A to B	£60
Disc Operating System	£95
Disc Drives	from £212
Cassette Recorders	£18.90
G3WHO RTTY PROGRAM	£7.50
Circuit board for RTTY decoder (inc. instructions)	£6.30
Computer Dust Covers	£3.00
CP80 and Star 510 Printers (inc. cable)	£330.00
Joysticks (pair)	£13.00
Printer Cable (Centronics)	£12.90
VIEW Word Processor	£59.00
WORDWISE Word Processor	£39.00

Wide selection of software, books, leads, plugs, etc.
SAE for full list. All available Mail Order

All prices apply while stocks last.

48 Linby Road, Hucknall,
Notts. NG15 7TS.
Tel: 0602 640377

(all prices include VAT)

Carriage extra

HALF-HEIGHT DISC DRIVES

	UNCASED	CASED	CASED & CABLES
40 Track S/S	£156.00	£167.00	£179.00
40 Track D/S	£196.00	£207.00	£220.00
80 Track S/S	£184.00	£196.00	£207.00
80 Track D/S	£242.00	£253.00	£265.00

Disc Interface Kit – £95.00

Prices include VAT. Format disc and user guide £5.00. Carriage £8.00

7 DAY TRIAL PERIOD. 12 MONTHS WARRANTY

CARSON DEVELOPMENTS (MU),
84 Highfield Road, Collier Row, Romford, Essex RM5 3RU.
Telephone: 0708 27043

VISION
SOFTWARE

COPY FILE II allows the user to prepare personal backup copies of most BBC micro programs. **£5 incl.**

- Programs can be transferred from tape to tape and, if disc compatible, from tape to disc.
- UNLOCKS LOCKED PROGRAMS
- For use with the BBC model A or B.
- Operating system 1.2 – Simple to use.
- Even backs-up DATA files. (SPOOL, PRINT # etc.)

COPY FILE II

Mail order only to: VISION SOFTWARE
1 Allington St., Liverpool. L17 7AD.

N.B. Users must not infringe any copyrights.

---

miracle

TALK TO US ABOUT A MIRACLE

Software programmers with genial ideas (preferably with machine code experience).

Work MIRACLES with us.

Up to 25% royalties paid for quality programs.

We require:-

Adventure, Strategy, Business & Educational Programs

for the BBC, DRAGON, SPECTRUM & ORIC.

Creative Minds – Create Miracles ...

Write or send tapes to:-

Miracle, 92-94, Wardour Street, London W1V 4JH.

Leigh Computer Systems

BBC Model A – Sinclair Spectrum 16K
BBC Model B – Sinclair Spectrum 48K
Dragon 32, Pace Discs from £212
Cabel Monitors £225, Epson RX £310 – FX £415
Star 510 £320 – 515 £415
CP80 £320 – Juki Daisy Wheel £485
Upgrade A to B – Pace Disc Drive Interface £95
Joysticks £17.50 – Speech Chip £55 – Wordwise £46

Quality software available:
Acornsoft, Program Power, Bugbyte, Computer Concept, Micropower, Superior Software, IJK, Digital Fantasia, etc, etc.

Don't be disappointed, order your Electron now.

Large items – add £5.00 p&p.

36 Derby Road, Hinckley, Leicestershire LE10 1QF.
Telephone: 0455 612139

Software for the BBC Micro

LOGO 2

One of our most popular programs to date. This is not a game, but an introduction to the LOGO graphics language that has become so popular in schools. It incorporates the 'turtle' graphics and many other features common to all LOGOS. Fascinating patterns or other graphics work can be built up very easily using the set of inbuilt commands. The command set can be extended by adding new 'words' to its vocabulary that are based on the existing set. Logo 2 can be used as a very simple graphics aid for young children, but it can incorporate more advanced ideas — defined procedures, sub-routines, loops and even recursive programming. Supplied with full documentation.

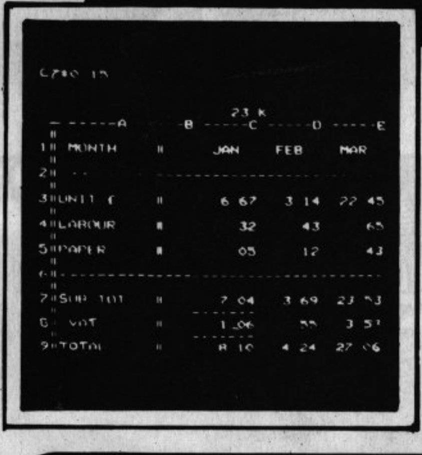
£10.00 + £1.50 p&p + VAT

..Now available..

for the BBC micro

Beeb Calc

The ROM based spreadsheet program



```
C7#0 15

                     23 K
 ------A      -B -----C -----D -----E
 ||
1|| MONTH      ||     JAN    FEB     MAR
 ||
2|| --         -------------------------
 ||
3||UNIT £      ||     6 67   3 14   22 45
 ||
4||LABOUR      ||       32     43      65
 ||
5||PAPER       ||       05     12      43
 ||
6||-------------------------------------
 ||
7||SUB TOT     ||     7 04   3 69   23 53
 ||                 -------
8|  VAT        ||     1 06     55    3 57
 ||                 -------
9||TOTAL       ||     8 10   4 24   27 06
```

BEEB CALC

Following on from WORDWISE this ROM based spreadsheet program is extremely simple to use though still very powerful. For applications that require a 'spreadsheet' or a table of figures to be manipulated this ROM will be invaluable. It need not be limited to just the obvious business applications of financial planning but is also ideal for home budgeting, etc. Includes many special features such as the ability to transfer 'sheets' to WORDWISE for inclusion into reports. 40 or 80 column screen display. changeable column widths etc.

£34.00 + £1.00 p&p + VAT

WORDWISE

The renowned word processing package. Still clearly the market leader with sales now over 10,000, this has become "the standard" word processor for the BBC Micro — and it's still receiving very favourable reviews. Wordwise will work with tape, disc or Econet and includes automatic word counting and full control over text entered into the system. Supplied with a detailed spiral bound manual and an excellent free typing tutor program.
After 6 months on the market there is still no other product as simple to use and as powerful as Wordwise.

£39.00 + £1.00 p&p + VAT

Wordwise
Wordwise
Wordwise
Wordwise

The word processor

FREE Typing tutor & example document

Buy it with Access

BARCLAYCARD VISA

COMPUTER CONCEPTS

DEPT BMU 9.
16 Wayside, Chipperfield, Hertfordshire. WD4 9JJ
Telephone: Kings Langley (09277) 69727

SEE YOU AT THE ACORN USER SHOW!

COMPUTER CITY

THE COMPUTER CAPITAL OF THE NORTH

78 VICTORIA ROAD, WIDNES, CHESHIRE. 051-420 3333

DISC DRIVES (including Disc Utilities and Manual)

Pace Single 100K Drive	£212.25
Pace Twin 100K Drive	£388.00
Acorn Twin 400K Drive (80 Track)	£804.00
Torch Twin 400K + Z80 & 64K	£897.00

SPECIAL OFFERS

PRINTERS

Seikosha GP100A (including free 'Screen Dump' Program)	£219.00
Seikosha GP250X	£270.00
Epson RX80	£319.00
Epson FX80	£455.00
Smith Corona TP/1 (Daisywheel)	£489.00

MONITORS

Microvitec 14″ Colour Monitor	£287.50
Sanyo Green Monitor	£89.00
Sanyo 14″ Colour Monitor (Composite)	£269.00

BBC

BBC Model B	£399.00
BBC Model A	£299.00
BBC Model A + 16K	£338.30
BBC Model A + 16K & VIA	£345.00

Carriage charges on Micro's, Monitors, Disc Drives and Printers £9.00

– **Special Summer Offer** –
CASSETTE RECORDER (BBC Compatible) **£19.95** P&P £1

NEW – STACK LIGHT PEN including FREE game (Concentration) **£28.75** P&P 50p

DIGITAL FANTASIA

ADVENTURE GAMES FOR THE BBC

	Inc. VAT
The Golden Baton (A/B)	£10.30
The Time Machine (A/B)	£10.30
Arrow of Death (Pt 1) (A/B)	£10.30
Arrow of Death (Pt 2) (A/B)	£10.30
Escape from Pulsar 7 (B)	£10.30
Circus (B)	£10.30
Feasibility Experiment (B)	£10.30
The Wizard of Akyrz (B)	£10.30
Perseus and Andromeda (B)	£10.30
Ten Little Indians (B)	£10.30

A & F SOFTWARE

Lunar Lander	£6.95
Planes	£8.00
Tower of Alos	£6.95
Frogger	£8.00
Pharoahs Tomb	£8.00
Painter	£8.00
Bouncer	£8.00
Shrinking Professor	£8.00
Horror Castle	£8.00

Intercepter

Intruders	£5.00

IJK

Star Trek/Candy Floss	£6.50
Hangman	£4.50
Super Hangman	£4.50
Beep Beeb	£4.50
Beebmunch	£6.50
Mutant Invaders	£6.50
3D Maze	£4.50
Model A Invaders	£5.50
Model B Invaders	£7.50
Word Pro	£10.50
Atlantis	£7.50
Flags	£4.50
Hyper Drive	£6.50
Strato Bomber	£7.50
Leap Frog	£7.50
5-a-Side Soccer	£7.50
Pontoon and Patience	£7.50

Kosmos

The French Mistress Level A	£9.95
The French Mistress Level B	£9.95

Doctor Soft

747 Flight Simulator	£6.95
Wolf Pack III	£7.95
Kremlin	£6.95
Harmony	£7.95

Bourne Educational Software

Animal/Vegetable/Mineral	£5.70
Word Hang	£8.99
Happy Numbers	£8.99
World Wise	£8.99
Timeman One	£8.99

BBC SOFTWARE

Home Finance	£10.00
Early Learning	£10.00
Music	£10.00
The Computer Prog. (Vol. 1)	£10.00
The Computer Prog. (Vol. 2)	£10.00
Painting	£10.00
Drawing	£10.00
Games of Stategy	£10.00
Fun Games	£10.00

ACORNSOFT

Business Games	£9.95
Tree of Knowledge	£9.95
Peeko – Computer/Manual	£9.95
Algebraic Manipulation	£9.95
Creative Graphics Cassette*	£9.95
Graphs & Charts Cassette*	£9.95
Desk Diary/Manual	£9.95
Lisp Cassette*	£16.85
Forth Cassette*	£16.85
Philosophers Quest	£9.95
Sphinx Adventure	£9.95
Castle of Riddles	£9.95
Monsters	£9.95
Snapper	£9.95
Planetoid	£9.95
Arcade Action	£11.90
Rocket Raid*	£9.95
Meteors	£9.95
Arcadians	£9.95
Sliding Block Puzzles	£9.95
Cube Master	£9.95
Super Invaders	£9.95
Missile Base	£9.95
Starship Command	£9.95
Countdown/Doom	£9.95
Snooker	£9.95
Number Balance	£9.95
Word Sequencing	£9.95
Word Hunt	£9.95
Missing Signs	£9.95

Quick Silva

Music Processor	£14.95
Protector	£7.95
Wizard	£6.95

Simonsoft

Disassembler	£6.95

SPECIAL OFFER
ORDER 2 CASSETTES – DEDUCT £1
ORDER 3 CASSETTES – DEDUCT £2 etc.

MICROPOWER

Moonraider (B)	£7.99
Swoop (B)	£7.99
Alien Destroyers (B)	£7.99
Galactic Commander (B)	£7.99
Timetrek (B)	£7.99
Laser Command (B)	£7.99
Spacemaze (B)	£6.85
Astro Navigator (B)	£5.70
Maze Invaders (B)	£5.70
Startrek	£5.70
Filer	£10.30
Constellation (B)	£6.85
Disassembler	£6.85
Micro Budget	£6.85
Killer Gorilla (B)	£7.99
Croaker (B)	£7.99
Chess (B)	£7.99
Chess	£5.70
Barrage (B)	£7.99
Footer (B)	£7.99
Labyrinths of Lacoshe (B)	£7.99
Adventure	£7.99
Painter (B)	£6.85
Cowboy Shootout (B)	£6.85
Munchyman	£6.85
Caveman Adventure	£6.85
Seek	£6.85
Eldorado Gold (B)	£6.85
Roulette (B)	£5.70
Reversi 1	£5.70
Reversi 2 (B)	£5.70
Yahtzee (B)	£5.70
Wall (B)	£5.70
Mastermind	£4.55
Draw	£10.30
Where	£6.85
Chemistry	£6.85
World Geography	£6.85
Junior Maths Pack	£6.85
Physics	6.85
Moon Base Alpha	£7.99

OPUS

Dog Fight	£9.95

SUPERIOR SOFTWARE

Galaxians	£7.95
Centipeds	£7.95
Invaders	£7.95
Space Fighter	£7.95
Alien Dropout	£7.95
Fruit Machine	£7.95
Frogger	£7.95
Road Runner	£7.95
Pontoon	£6.95
Cribbage	£6.95

SQUIRREL SOFTWARE

BBC

Supergolf	£7.50
Bun Fun	£6.50

BUG-BYTE SOFTWARE

Space Pirates	£8.00
Space Warp	£9.00
BBC Dragon Quest	£11.50
BBC Fruit Machine	£5.50
BBC Chess	£8.00
BBC Backgammon	£8.00
BBC Multifile	£15.00
Space Invaders	£7.50
Galaxy Wars	£7.50
City Defence	£7.50
Synthesizer	£9.50
Sea Lord	£7.50
Oblivion	£7.50
Old Father Time	P.O.A.
Graphics Package	£9.50
Sea Lord	£7.50

LEVEL 9 COMPUTING

ULTIMATE ADVENTURES

Colossal Adventure	£10.00
Adventure Quest	£10.00
Dungeon Adventure	£10.00
BBC Forth	£15.00
BBC Forth Tool Kit	£10.00

GEMINI MARKETING LIMITED

BUSINESS SOFTWARE

Cash Book Acc.	£95.00
Beeb Calc	£19.95
Inv. & Statements	£19.95
Commercial Acc.	£19.95
Mailing List	£19.95
Database	£19.95
Stock Control	£19.95
Home Accounts	£19.95
Word Processor	£19.95

Simon Hessel

Great Britain	£5.95
Inheritance	£6.95
The World Travel Game	£6.95

WORD PROCESSING

Wordwise	£45.00
View	£59.00

BOOKS FOR THE BBC MICROCOMPUTER

1	30 Hour Basic (NEC)	£5.50
2	Programming the BBC (Newnes)	£6.50
3	Easy Programming for the BBC Micro (Shivas)	£5.95
4	Let Your BBC Micro Teach You To Program (Interface)	£6.45
5	Assembly Language Programming for BBC (MacMillan)	£8.95
6	BBC: An Expert Guide (Granada)	£6.95
7	The BBC Micro Revealed (Interface)	£7.95
8	Programming the 6502 (Sybex)	£10.75
9	Advanced 6502 Programming (Sybex)	£10.25
10	Machine Code for Beginners (Sybex)	£5.95
11	Practical Programs for BBC and Atom (Wiley)	£5.95
12	30 Programs for the BBC Micro (Evans)	£4.95
13	Games BBC Computers Play (Addison Wesley)	£6.95
14	The Book of Listings (BBC Publications)	£6.75
15	The Computer Book (BBC Publications)	£6.75
16	Creative Graphics (Acornsoft)	£7.50
17	Graphs and Charts (Acornsoft)	£7.50
18	Forth Manual (Acornsoft)	£7.50
19	Lisp Manual (Acornsoft)	£7.50

P & P on Books £1.

CREDIT FACILITIES

Ask about instant credit up to £1,000. Choose the credit to suit you. The deposit is only 10% of the cost of your purchase.

We are credit brokers for Lombard Tricity Finance Ltd. Interest is just 2.25% per month, equivalent to an annual percentage rate of 30.6%. Ask for a written quotation today!

MAIL ORDER

Please send me
1. ....
2. ....
3. ....
4. ....
5. ....

Postage and packing on software 50p. Phone for hardware delivery rates.

I enclose cheque/P.O. for

OR please debit my Access/Barclaycard/Visa* ....
* delete as applicable

Card No .... Expiry date ....
Name ....
Address ....
.... Code ....
Tel No. ....

Dealers Discount Available
ACCESS, BARCLAYCARD VISA ORDERS WELCOME ON 24HR **051-420 3333**
COMPUTER CITY Dept F. FREEPOST (No Stamp Required) **78 Victoria Road, Widnes, Cheshire WA8 7RA.**

TRADE ENQUIRIES WELCOME.
SPECIAL DEALS FOR SCHOOLS.

THE COMPUTER CAPITAL OF THE NORTH – SUPPLYING *BBC* MICROCOMPUTERS NATIONWIDE FOR EDUCATION, BUSINESS AND LEISURE

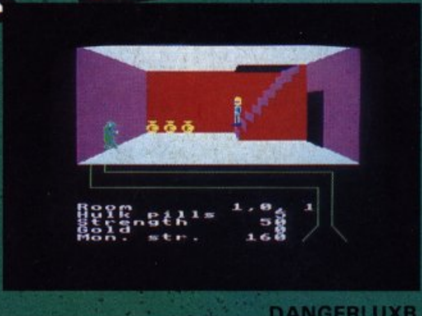
PROGRAMPOWERMICROPOWER

A GREAT NEW 3D ADVENTURE FROM BRITAIN'S LEADING SOFTWARE HOUSE!

ESCAPE FROM MOONBASE ALPHA

ONLY £7.95

Fight for your life in this exciting, all action '3-D' graphics adventure. You have been left for dead by your crew members in the vast complex known as Moonbase Alpha. Dash from room to room, up and down stairs and ladders in your attempt to escape. Search for the kindly doctor, somewhere on level seven, and if you have collected enough gold, he will transport you to safety in his time machine. If you think that sounds easy, you haven't bargained for the Green Grappler, Deadly Doris, the Metal Mauler, Demon and Maryin. If you get into difficulties the Wizard is there to help you, and as a last resort, you may take a pill and increase your strength by turning into a Hulk. You may never find your way out, but you will have lots of fun trying!



MOON RAIDER (Model B) £7.95

As pilot of the highly manouverable Space Fighter you must try to penetrate the defences of the alien moon. Your craft is armed with a rapid-fire laser cannon and a large quantity of the latest Tryex bombs. Against you are self-firing rockets, nuclear Ack-Ack guns, spacemines, 'Fizzers' and meteors not to mention the network of narrow passageways that need to be negotiated. You have only limited fuel which must be replenished by either bombing the enemy fuel dumps or docking with the refuelling station. There are 6 phases to get through and 4 levels of difficulty. The game can be started at any phase and on any level. The controls are either from joysticks or from standard or user-defined keys. A game of the very highest standard.

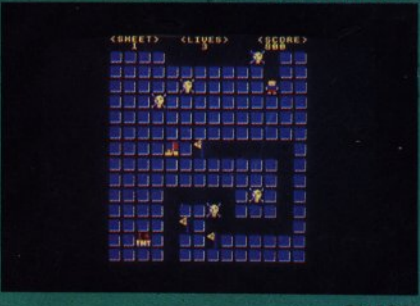
DANGER! UXB £7.95

An explosive new, machine code release from Program Power. Based on the popular arcade game, the object of Danger UXB is to run and slide from bomb to bomb, defusing them as you go. Three levels of starting difficulty cater for all levels of player, each level being progressively harder. Every skill level has its own 'Hall of Fame' with scores ranked from poor to master. Excellent graphics and sound, along with great attention to detail (such as the Stomping Boots and Bonus points), make this a very addictive game.

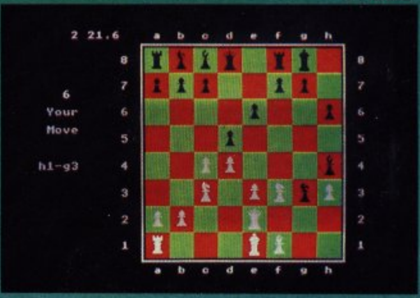
CHESS (Model A £5.95 Model B £7.95)

Our excellent machine code program — now with superby MODE 1, colour graphics. Six skill levels, play black or white, illegal moves rejected, 'en passant', castling, take-back of moves, and include Blitz Chess where you must move in 10 seconds, set-up of positions for analysis, replay of a game just played and saving of part completed games on tape. On loading, a 1972 Spassky/Fischer game can be replayed.

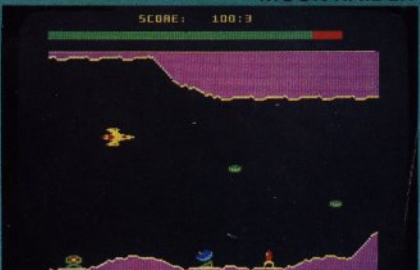
DANGER! UXB



CHESS



MOON RAIDER



MP
MICRO POW
3D
WATCH OUT FOR FELIX

Other programs available: Killer Gorilla £7.95/Demon Decorator £6.95/Croaker £7.95/Alien Swirl £6.95/Reversi (A & B) £5.95/Asteroid Storm £7.95/Laser Command £7.95/Swoop £7.95/Wall £5.95/Beebtote £5.95/Caveman Adventure £6.95/Labyrinths of Lacoshe £7.95/Adventure £7.95/World Geography £6.95/Where? £6.95/Constellation £6.95/Physics £6.95/Chemistry £6.95/Junior Maths Pack £6.95/Barrage £7.95/Galactic Commander £7.95/Timetrek £7.95/Footer £7.95/Poker Dice £5.95/Filer £9.95/Beebmon £7.95/Draw £9.95/Disassembler £6.95.

Written any Programs? We pay 20% Royalties for DRAGON, SPECTRUM, B.B.C. PROGRAMS

Guarantee
THAT ALL OUR ADVERTISED PROGRAMS HAVE BEEN COMPLETED AND ARE READILY AVAILABLE

WE ARE AUTHORISED DEALERS FOR ACORN ATOM, BBC MICRO & DRAGON 32

SPECIAL OFFER
Deduct £1 per cassette when ordering two or more

MICRO POWER LTD.
Dept. AU8
8/8a REGENT STREET,
CHAPEL ALLERTON,
LEEDS LS7 4PE
Tel: (0532) 683186 or 696343

All prices inclusive of VAT. Please add 55p per order Post and Packing.

Access VISA

Please note: All programs are available at all good dealers or direct from MICRO POWER LTD.
***Now also available at selected W.H.Smith stores**

ALL LEADING TITLE
WILL BE AVAILAB
FOR THE NEW
ELECTRON